MEDICAL LIBRARY

DEC 6 - 1935

Tuberculosis Number

This Issue Exceeds 91,300 Copies

THE JOURNAL

OF THE

American Medical Association

Subscription, $7.00 | PUBLISHED WEEKLY | Single Copies, 25 Cents

VOLUME 105, No. 23 | 535 North Dearborn Street, CHICAGO, ILL. | DECEMBER 7, 1935

CONTENTS AND SUBJECT INDEX

Modern Concepts of Roentgen Therapy in Cancer. W. E. Chamberlain, M.D., Philadelphia.....1817

Etiology of Cancer: A Partial Review. Lloyd F. Craver, M.D., New York.....1820

Relation of Leukemia of Animals to Leukemia of Man. Jacob Furth, M.D.; Henry W. Ferris, M.D., and Paul Reznikoff, M.D., New York 1824

Papers of Dr. Chamberlain, Dr. Craver and Drs. Furth, Ferris and Reznikoff discussed by Drs. Richards, Waugh, Diamond, Lund, Chamberlain and Furth.

Lobar Collapse in Children. Gladys L. Boyd, M.D., Toronto.....1832

Discussed by Drs. Stokes, Wall, Anspach and Boyd.

Osteomyelitis in Infancy. William Thomas Green, M.D., Boston.1835

Discussed by Drs. Ober and Green.

Tuberculous Lymphadenitis Secondary to Inconspicuous Healed Traumatic Cutaneous Tuberculous Lesions. B. N. Carter, M.D., and Jacob Smith, M.D., Cincinnati.1839

Program for Tuberculosis Control in Puerto Rico. Edwardo Garrido Morales, M.D., San Juan.....1842

CLINICAL NOTES, SUGGESTIONS AND NEW INSTRUMENTS

Pneumococcic Meningitis: Report of a Case with Recovery Following Cisternal Drainage. P. R. Meyer, M.D., Port Arthur, Texas....1844

Pneumococcic Cerebrospinal Meningitis with Recovery. Homer R. Smith, M.D., Minneapolis....1845

SPECIAL ARTICLE

Nonspecific Protein Therapy. R. L. Cecil, M.D., New York.....1846

COMMITTEE ON FOODS 1854

EDITORIALS

The Tuberculosis Survey.....1916

Growth of Long Bones.....1917

The Iron Requirement of Man..1917

CURRENT COMMENT

Climate in Relation to Pulmonary Tuberculosis 1918

(Subject Index on next page)

ASSOCIATION NEWS 1919

TUBERCULOSIS SURVEY

Tuberculosis Hospitals and Sanatoriums in the United States..1855

Summary by States.....1892

Tuberculosis Hospitals and Sanatoriums, Departments and Preventoriums 1899

Tuberculosis Departments of Hospitals 1909

Preventoriums 1915

Index for Tuberculosis Data...1915

A.M.A. CONVENTION • KANSAS CITY, MO. • MAY 11-15, 1936

Medical Treatment *of* Gallbladder Disease

By Drs. MARTIN E. REHFUSS and GUY M. NELSON

We consider this brand new book—just off press!—one of the most important we have published in many years . . .

because gallbladder disease is one of the most common disorders of the upper abdomen, constituting 40 to 50 per cent of the ailments of adults, and forming a large part of the daily practice of the Family Physician

because this book was written specifically to meet the particular needs of the Family Physician and help him solve gallbladder problems

because it is devoted wholly and solely to Medical Treatment and the means of arriving at a diagnosis

because the methods of diagnosis and the plans of treatment which it gives are those that have been developed by the authors themselves over a period of 20 years

because it sets down clearly and precisely today's methods, procedures and treatments, as applied day in and day out by these distinguished specialists.

Details in SAUNDERS ANNOUNCEMENT—Page 3

SUBJECT INDEX TO THIS ISSUE

The letters used to explain in which department the matter indexed appears are as follows: The Star (*) indicates an Original Article; "ab," abstract; "E," Editorial; "C," Correspondence; "MI," Medicolegal; "ME," Medical Economics.

A. M. A. Congress on Medical Education..1919
Exhibit on Fractures, Kansas City.....1919
Accidents, street, to pedestrians, London...1925
Allergy as cause of agranulocytosis and purpura ab-1942
reactions to nonspecific protein.....*1848
Alpha Omega Alpha lecture.....1923
Ambulance service for Ethiopia.....1925
American Board of Obstetrics and Gynecology 1923
Anemia, microcytic, hypochromic, in childhood ab-1941
Anesthesia, Society of, Italy.....1927
Angina, agranulocytic, allergy as cause..ab-1942
agranulocytic, after gold therapy.....ab-1945
Animals, leukemia of, relation to that of man *1824
Army, French, negative skin reactions.....1925
Arthritis, acute and chronic, nonspecific protein therapy *1850
rheumatoid, Progynon B for.....ab-1948
treatment with colloidal sulphur.....ab-1943
tuberculous, surgical treatment.....ab-1944
Association News.....1919
Asthma, nonspecific protein therapy.....*1852
Automobile accidents injuring pedestrians..1925

Bardeen, C. R., memorial lecture.....1923
Beaumont's grave, pilgrimage to, St. Louis.1921
Blood cells, immature, tumor formation by.*1828
chemistry in parathyroprivic tetany...ab-1947
coagulation, effect of testis hormone and estrogenic substance on.....ab-1947
picture in poliomyeltis.....ab-1948
sedimentation test in tuberculosis.....1935
transfusion, first employed by Dr. Folli..1928
vessels, degenerative disease.....ab-1942
vessels, disease, nonspecific protein therapy *1852
Board Examinations.....1937
Body height of Japanese students.....1928
Bones, long, growth of.....E-1917
Book Notices.....1937
Books Received.....Adv. Page 34
Brain, removal of hemispheres.....ab-1945
Bronchiectasis with lobar collapse.....*1832
Bronchitis with bronchiectasis.....1936

Cancer, etiology; partial review.....*1820
education, record in, Louisiana.....1921
extract, allergy to, basis of preventive treatment ab-1947
"Fight Cancer with Knowledge".....1923
leukemia of mice as neoplastic disease..*1824
research laboratories transferred, Philadelphia 1922
treatment, roentgen *1817
Carotene-vitamin A metabolism and thyroid ab-1947
Carotid Sinus in pulmonary edema.....ab-1946
Cerletti, Professor, called to U. of Rome...1928
Cisterna Magna, drainage in peumococcic meningitis *1844
Climate in relation to pulmonary tuberculosis E-1918
Cole, Herbert P., Mobile C. of C. honors...1920
Committee against Infantile Paralysis...C-1932
Committee on Foods.....1854
Correspondence.....1932
Coulter, A. B., named tuberculosis coordinator 1920
Cream puffs, eight made ill by.....1922

Death, right to die.....1924
Deaths.....1930
Dental practice acts: licenses, revocation..MI-1940
service in tuberculosis institutions.....*1871
Dermatitis, atrophic, chronic, of vulva..ab-1944
Dermatology, International Congress.....1928
Diarrhea, summer, lactic acid milk prevention in ab-1942
Diet sensitivities; drinking highballs made with ginger ale.....1936
Diphtheria antitoxin, nonspecific protein therapy *1847
Diseases: occupational; combined sclerosis attributed to zinc poisoning.....MI-1939

Empyema, from fusospirochetal infection.ab-1941
Epinephrine, skin reaction to, in scarlet fever ab-1946
Erythrocytes, Heinz bodies within.....ab-1948
Estrogenic Substance, effect on blood coagulability ab-1947
Ethiopia, ambulance service for.....1925
medical supplies for.....1923
Euthanasia, right to die.....1924
Eye, diseases, nonspecific protein therapy.*1851

Folli, Francesco, ceremonies honoring.....1928
Food poisoning outbreak in prison, Indiana.1921
Foreign Letters.....1924
Franklin, Philip, tragic fire in surgeon's house 1925

Genito-urinary Tract infections, nonspecific protein therapy *1851
Georgia Warm Springs Foundation, Inc..C-1932
Ginger ale, drinking highballs made with..1936
Gold therapy, agranulocytosis after.....ab-1945
Government Services.....1924
Growth of long bones.....E-1917

Harvey Lecture, third.....1922
Hay Fever pollens in Pennsylvania.....1935
Hayashi, N.....1929
Health, Florida Public Health Association..1920
of high school students.....1929
service for employees in tuberculosis institutions *1869
state conference, Illinois.....1920
study tour of U. S.....1925
Heart, electrocardiogram of new-born...ab-1945
insufficiency, decompensation, squill for.ab-1941
muscle infarct, absence of pericardial murmur in ab-1947
Heliotherapy in tuberculosis institutions..*1873
Histamine, skin reaction in scarlet fever.ab-1946
Hookworm survey, Alabama.....1920
Hospitals approved for training physicians in tuberculosis.....*1874; E-1916
general, tuberculosis departments.....*1889
positions open at St. Elizabeth's.....1924

Industrial rehabilitation in tuberculosis sanatoriums *1876
Infants, new-born, electrocardiogram....ab-1945
Infection, nonspecific protein therapy.....*1849
Iron requirement of man.....E-1917

Jaundice, spirochetal, Weil's disease....ab-1948

Labor, physicians in attendance at.....1922
Laboratory facilities in tuberculosis sanatoriums *1872; *1873
Lavan, J. L., health officer, Grand Rapids..1921
Leukemia of animals, relation to leukemia of man *1824
Library, medical, in tuberculosis institutions *1877
Liver function and Takata reaction in children's disorders ab-1948
Lungs collapse (lobar), in children.....*1832
abscess and gangrene ab-1941
edema, carotid sinus in.....ab-1946
Lymphadenitis, tuberculous *1839
Lymphosarcoma, formation by immature blood cells *1828

Malleolus, external, treatment of fracture.ab-1946
Marriages.....1929
Medical Education, activities in tuberculosis institutions *1873
premedical requirements now three years, Loyola 1920
Medical Examinations and Licensure.....1937
Medicolegal.....1939
Meetings, Coming Meetings.....1940
Meningitis, pneumococcic cerebrospinal, use of Felton serum.....*1845
pneumococcic: recovery after cisternal drainage *1844
Milk, fresh and canned, mineral content.ab-1943
lactic acid, to prevent summer diarrhea.ab-1942
therapy, methods *1846
Myeloma, formed by immature blood cells.*1828

National Research Council, grants available.1923
Necropsy service in tuberculosis institutions *1873
News.....1920
Nicholas, J. S., professor of comparative anatomy 1920
Noise, drive to reduce, Chicago.....1920
Nurses' training schools in tuberculosis sanatoriums *1875

Osteomyelitis in infancy.....*1835

Pain, relief of, Italian Society discusses...1927
Pediatrics, hepatic function and Takata reaction in ab-1948
Peptic Ulcer, experimental.....ab-1944
nonspecific protein therapy.....*1851
Pneumococcus cerebrospinal meningitis; use of Felton serum.....*1845
meningitis, recovery after cisternal drainage *1844
Pneumonia, nonspecific protein therapy...*1849
Poliomyelitis, blood picture in.....ab-1948
committee against C-1932
epidemic and endemic.....ab-1948
prevalence, U. S.....1923
Progynon B, treatment of rheumatoid arthritis ab-1948
Protein therapy, nonspecific.....*1846
Purpura, allergy as cause of.....ab-1942
haemorrhagica after gold therapy.....ab-1945

Queries and Minor Notes.....1933

Radio advisory board, Washington, D. C...1920
Radio Broadcasts.....1919
Raynaud's Disease, nonspecific protein therapy *1852
Records, medical, in tuberculosis sanatoriums *1877
Roentgen Ray facilities in tuberculosis sanatoriums *1872

Scarlet Fever, skin reaction to histamine and epinephrine in.....ab-1946
Schools, medical, inspector's board, Japan..1929
Sclerosis, multiple, nonspecific protein therapy *1850
Sevringhaus, E. L., to lecture at Psychoanalytic Institute.....1920
Silicosis: tuberculosis attributed to; employer's liability MI-1939
Skin, diseases, nonspecific protein therapy.*1851
reaction to histamine and epinephrine in scarlet fever ab-1946
tuberculosis, tuberculous lymphadenitis secondary to *1839
Society Proceedings.....1940
Southern Surgical Association.....1924
Spirochetosis, pyothorax due to fusospirochetal infection ab-1941
Squill, derivative, clinical experience....ab-1941
State Board, officers, Georgia.....1920
State Board Reports.....1937
Stoner, George D., violates Food and Drugs Act 1924
Students, high school, health of, Japan....1929
Japanese, average size.....1928
number at German universities.....1926
Syphilis, latent 1936
nonspecific protein therapy.....*1849

Tar derivatives, relation to hormones and sterols in cancer.....*1822
Tateki, Yutaka 1929
Testis hormone preparations effect on blood coagulability ab-1947
Tetany, parathyroprivic, blood chemistry in ab-1947
Texas State Medical Association, new home.1923
Thrombo-Angiitis obliterans, nonspecific protein therapy *1852
Thromboses, pathogenesis ab-1946
Thyroid, carotene-vitamin A metabolism and ab-1947
Tibia, fracture, which extends into knee...1936
Tonics and Sedatives.....Adv. Page 30
Trichomonas vaginalis vaginitis, amebicide powder and vinegar douche for.....ab-1942
Tuberculin test, interpretation of.....1933
tests, periodic, use in children.....1933
tests; reaction appearing on seventh or eighth day 1935
Tuberculosis, artificial pneumothorax in....1936
control, program for, in Puerto Rico....*1842
coordinator, Dr. A. B. Coulter, Washington, D. C.....1920
immunization, B C G, of medical students.1925
in children, use of periodic tuberculin tests to control 1933
institutions, summary by states..*1832; *1899
mortality rates compared with 20 years ago 1933
negative skin reactions in French Army..1925
pulmonary, artificial pneumothorax in...*1870
pulmonary, climate in relation to.....E-1918
pulmonary, when should children be excluded from school?.....1934
sedimentation test in.....1935
seminars, Philadelphia.....1922
Sharon Sanatorium honors founder.....1921
survey of hospitals and sanatoriums *1855; E-1916
treatment, von Ruck vaccine in.....1934
Tumor formation by immature blood cells..1828
Typhoid, treatment, protein.....*1848
vaccine, therapeutic use.....*1846

University, German, recent developments...1926
of Syracuse new medical school.....1921
of Texas, changes at.....1923
Uterus adnexitis, nonspecific protein therapy *1851

Vaccines, nonspecific protein therapy.....*1847
Veterans hospitals, cost of tuberculosis hospitalization *1878
Vitamin A-carotene metabolism and thyroid ab-1947
Vulva, chronic atrophic dermatitis of....ab-1944

Warnshuis, Frederick C., dinner to.....1921
Warren Prize, Dr. Freeman wins.....1921
Weidlein, E. R., honored.....1922
Welch Lecture.....1922
Workmen's Compensation Acts: hernia; strangulation of pre-existing hernia.MI-1940

THE JOURNAL of the American Medical Association is published weekly by the American Medical Association, 535 North Dearborn Street, Chicago, Ill. Subscription price, $7.00 a year. 25c a copy. Canadian $8.50. Foreign $11.00. Entered as second class matter June 25, 1885, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

Volume 105. No. 23. *Copyright 1935 by the American Medical Association.*

The Journal of the American Medical Association

Published Under the Auspices of the Board of Trustees

VOL. 105, NO. 23 CHICAGO, ILLINOIS DECEMBER 7, 1935

MODERN CONCEPTS OF ROENTGEN THERAPY IN CANCER

W. EDWARD CHAMBERLAIN, M.D.
PHILADELPHIA

Roentgen discovered the x-rays in November 1895.[1] The news reached the world of science and medicine in January 1896. In an incredibly short time physicians all over the world, oblivious to the possible biologic effects of the new ray, were using it in diagnosis. It soon became apparent that the penetration of the rays through living tissue was not without harmful potentialities and biologic effects.

Haphazard attempts to use the x-rays therapeutically in 1896-1897 were of little significance and were but gropings in the dark. The earliest announcements (1897-1898) of proved therapeutic value, based on scientific observation, concerned diseases of the skin. Applications to malignant disease probably date from the reports of Sjögren,[2] Stenbeck [3] and Pusey.[4]

The development of roentgen therapy to its present state of relative enlightenment has been immeasurably aided by the excellent work of physicists and engineers. They have made advances technically possible. Nevertheless it must be pointed out that the greatest barriers that have been surmounted have been in the strictly biologic field. This is important, for there has been, from the very beginning, an unfortunate tendency to treat each purely technical advance as of inherent value to the cancer patient. Every time a new tube stand or a shinier control panel comes from the apparatus manufacturer, some one is sure to acclaim it as of fundamental worth. Yet there has never been a period in the history of roentgen therapy when the potentialities actually at hand were used with complete intelligence and thorough application of all proved facts. It is necessary to stress this point in order to review intelligently the history of this therapeutic modality. Had the roentgen therapist of 1910-1918 made full use of available knowledge, the mistaken ideas of 1918-1924 would not have had their vogue. Today, as one reads the sometimes unconservative accounts of treatment with x-ray tubes operating at voltages of the order of a million, one may ask oneself whether the voltage applied to the x-ray tube is not of minor importance in comparison with the selection of the proper technic for the individual cancer problem.

At the close of the war, in November 1918, there came out of Germany a series of announcements suggesting that the increase of the voltage factor to 200,000, and the increase of filtration made possible by the use of such voltages, had revolutionized the art by substituting "cancer killing" for "treating patients." That the overenthusiasm of 1919-1924 was unjustified is now well known. That tumor regressions were observed with greater regularity than with older technics cannot be denied. The mistake was in ascribing the change to the increase of voltage and filter when the chief alteration of technic was in the size of the dose delivered. In other words, at the moment of change-over from 135,000 volts to 200,000 volts, and from aluminum to copper filters, very significant changes were made in the size of the total dose, the distance of the patient from the tube and the periodicity of treatments. Most radiologists now recognize the fact that the voltage factor, long believed to be the most important, was actually one of the least important factors changed at that time.

As soon as it was discovered that the so-called deep therapy of 1919 produced a pitifully small percentage of "cures" of deep seated cancer, overenthusiasm gave way to unwarranted skepticism. It became customary to doubt the original diagnosis in every case of apparent cure. However, in the ten years between 1918 and 1928 the real foundations for present roentgen therapy were laid. First came the physicists, with accurate methods of measurement under standardizable and reproducible conditions. For the first time it became possible for physicians in various parts of the world to describe their dosage and quality factors in terms of the centimeter-gram-second system of international physical units. This important advance paved the way for the work of the research biologist, who brought forth scientific data regarding the effects of measured amounts and specified qualities of x-rays on standardized biologic material.

The history of roentgen therapy in cancer from the beginning down to the present day may be tabulated about as follows:

1896-1903, gropings, discovery that tumor regression could sometimes be produced.

1903-1906, optimism based on wishful thinking and ignorance of inherent limitations.

1906-1910, fear of roentgen injuries and natural discouragement, which paved the way for

1910-1918, first period of disrepute, characterized by unwarranted skepticism and courageous perseverance by a few pioneer spirits.

1918-1924, optimism based on the mistaken idea that the increase of voltage from 135,000 to 200,000 had introduced revolutionary changes in the possibility of cure.

Read before the Section on Practice of Medicine at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 13, 1935.

1. Glasser, Otto: Wilhelm Conrad Röntgen and the Discovery of the Roentgen Rays, in the Science of Radiology, Springfield, Ill., Charles C. Thomas, 1933.

2. Sjögren, Tage, and Sederholm, E.: Beitrag zur therapeutischen Verwertung der Röntgenstrahlen [including report of case presented by Sjögren before the Society of Swedish Physicians on Dec. 19, 1899], Fortschr. a. d. Geb. d. Röntgenstrahlen **4**: 145, 1901.

3. Stenbeck, Thor: Ein Fall von Hautkrebs, geheilt durch Behandlung mit Röntgenstrahlen [report of case presented before the Society of Swedish Physicians on Dec. 19, 1899], Mitt. a. d. Grenzgeb. d. Med. u. Chir. **6**: 347, 1900; Fall af hudkräfta, läkt genom behandling med Röntgenstrålar, Hygiea **62**: 18, 1900.

4. Pusey, W. A.: Report of Cases Treated with Roentgen Rays, J. A. M. A. **38**: 911 (April 2) 1902.

1924-1928, second period of disrepute, during which scientific investigators continued to lay the foundations for

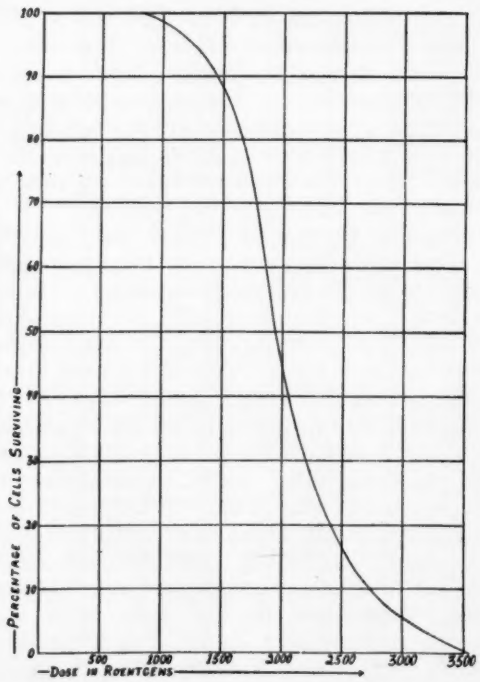
1928-?, the period of healthy growth, steady progress in refinement of technic, scientific evaluation of the method.

If the star of roentgen therapy wanes again it will be because a brighter star has risen to outshine it, not because the present use of the method is founded on wrong concepts or unjustified optimism. It is recognized today that, in spite of thousands of cures and countless valuable palliations, irradiation, like surgery, is not the final answer to the cancer problem. Realization of this fact does not interfere with continued progress. It should shield one, however, from the mistake of ascribing revolutionary virtue to the interesting technical changes that loom so large on the present-day horizon.

LIMITATIONS OF THE METHOD

The scientific roentgenologist of today recognizes certain limitations inherent in his method:

1. The tumor he is treating is surrounded by and intimately associated with normal tissues, the integrity



Survival and mortality curve for Flexner rat carcinoma exposed to varying doses of x-rays (after Charles Packard). As much as 800 roentgens failed to influence survival (subthreshold); 10 per cent of the tumor cells were killed by 1,450 roentgens, 50 per cent by 1,950 roentgens, and approximately 1 per cent survived doses as high as 3,500 roentgens.

of which must be preserved. The tolerance of these normal tissues is often not sufficient to permit him to use a large enough dose to cure the cancer. Some progress has been made toward overcoming this limitation, particularly by fractionating the dose,[5] but there are reasons for believing that this will always remain an important limiting factor.

2. Amounts of radiation that are sufficient to rid the patient of from 90 to 99 per cent of his tumor cells may not have any permanent deleterious effect on the remainder, as shown in the illustration. One of the fundamental laws of biologic effects of irradiation is involved in this inherent limitation.[6]

3. Seemingly uncontrollable factors are involved. When cures are obtained the dose has frequently been less than would have been necessary for an actual destruction of all the cells of the cancer. Factors other than a direct lethal effect on the tumor must have been operative. One of these factors may be in some way involved in the fibrosis that sometimes follows irradiation. Viable cancer cells may remain for many years in the tissues of a clinically cured carcinoma patient. This accounts for the occasional, very disturbing late recurrence after apparent radiologic cure. The indications for coping with this factor are not clear. At first glance it might appear that surgical removal of the involved organ or tumor bed should follow, as a routine, the production of an apparent cure by irradiation. The trouble with this is that when the original tumor was inoperable there is a great likelihood that the subsequent surgery will cut through some of the encapsulated collections of arrested but viable tumor cells, with resultant disastrous recurrence. It is often safer to "let sleeping dogs lie," though in doing so one may be leaving the sword of Damocles over the patient's head.

4. After irradiation has been extensively used in a given case, whether efficiently or inefficiently, the response of that case to subsequent irradiation may be very disappointing. In a certain percentage of cases a thorough trial of irradiation may close the door to all known forms of therapy, both surgical and radiologic. The reasons for this are not well understood.

5. Like the surgeon, the radiologist suffers the limitation that he is frequently unable to foretell the result of his therapy. Actually his dilemma is greater than the surgeon's, for the latter's is concerned with the location, size and distribution of the tumor, factors that admit of a certain degree of analysis. The corresponding factors for the radiologist, on the other hand, are susceptibility of the tumor cells and certain intangible factors that may be grouped under the general term of the reaction of the patient's tissues. This inability to foretell the outcome in a given case operates as a practical limitation, for it tends to preserve an unfortunate suggestion of experimentation, leading one to advise surgery even in cases that might be treated better by irradiation.

RECENT ADVANCES

In spite of a better knowledge of the limitations of the method, roentgen therapy is being used more extensively today than at any previous time. This fact alone is sufficient evidence that the method has proved merit, for the present vogue is based not on superstition or wishful thinking but on sound knowledge and proved fact. Improvements in apparatus, while immensely valuable, have had small part in promoting this increasing use of irradiation. The important advances have been in the knowledge of how best to divide the dose, how best to preserve the integrity of the normal tissues, and how large a total dose to administer in a given case. These are the advances that deserve attention at this point.

1. *New Knowledge of the Nature and Degree of Skin Tolerance and the Recovery of the Skin After Irradiation.*—Looking back fifteen years, I am surprised that it has taken so long to uncover the facts regarding the nature and rate of recovery of the skin from the immediate effects of irradiation. Fear of permanent damage was undoubtedly the chief cause of the delay, but the simplicity of the methods that finally opened the eyes of the profession leads one to wish

5. Coutard, Henri: Principles of X-Ray Therapy of Malignant Diseases, Lancet **2**:1 (July 7) 1934. Forssell, Gösta: Radiotherapy of Malignant Tumours in Sweden, Brit. J. Radiol. **3**:198 (May) 1930. Regaud, C.: Sur les principes radiophysiologiques de la radiothérapie des cancers, Acta radiol. **11**:455, 1930.

6. Packard, Charles: Biologic Effects of Roentgen Rays and Radium, in the Science of Radiology.

that the superstitions of yesteryear had been dissipated sooner. Only a short time ago radiologists were practically in agreement that skin recovery from the immediate effects of fractional doses of 200 kilovolt, copper-filtered x-rays took place at a rate of from 5 to 9 per cent daily and that this recovery rate could be expressed by a fairly simple logarithmic curve. Through the work of Duffy, Arneson and Voke,[7] presaged by the courageous experiments of Coutard,[8] it is now known that recovery may be as high as from 60 to 70 per cent during the first twenty-four hours after a first exposure and from 70 to 80 per cent during the first forty-eight hours. Expressed in terms of practical units, this means that a year ago it was believed that two 400 roentgen doses, twenty-four hours apart, would produce the same effect on the skin as a single dose of about 750 roentgens; it is now known that such a series results in a skin effect equivalent to that produced by a single dose of about 525 roentgens.

2. *Increasing Knowledge of the Relationship Between the Location, Type and Microscopic Appearance of the Tumor and the Most Effective Method of Applying the Irradiation.*—In this matter the profession is on the very frontier of progress. Many experienced radiologists are as yet not fully aware of the full significance of this and related studies. Because Coutard and others have shown that protracted fractional daily dosage will produce a hundred times as many five-year cures of pharyngeal and laryngeal cancer as will any single-dose technic, there is an unwarranted tendency to treat every tumor after the method of Coutard. Unless the rate of recovery from the effects of radiation is slower in the tumor than in the normal tissues, including the skin, protracted daily fractionation is valueless or even inferior. Present indications are that clinical experience plus a proper attention to the microscopic appearance of the biopsy specimen may lead to a definite improvement in results through more and more individualization in the selection of the treatment technic. I have had the experience of obtaining a three year cure in a case of lymphosarcoma of the tonsil treated by a short intensive three-day series, after a protracted fractional method had produced only partial regression, with rapid recurrence during the tenth week after the end of the first treatment series.

Authorities in the field of radiation therapy have always preached individualization. A scientific basis for such individualization is now being set up. As a further example of what may be expected in this field, one may point to the varying effects of different technics on the vascular elements in the irradiated tissue. The arterioles and capillaries are apparently able to recover very well from the effects of a Coutard series, from 100 to 200 roentgens per day, for example, with a total dose in the neighborhood of 3,000 roentgens; a considerably smaller total dose may produce disturbing avascularity if delivered in 500 roentgen fractions at intervals of the order of one month. Ginsburg[9] showed in 1927 that the skeletal metastases of certain very radiation-resistant thyroid adenomas may respond favorably to the fourth or fifth monthly series, though apparently quite refractory to a single series of any type. It is reasonable to believe that such results are due to a favorable diminution in the blood supply of the tumor, the tumor itself being too resistant to respond directly to the irradiation. Some believe that, when knowledge is more complete, some tumors will be attacked by single massive doses, some by the protracted fractional dose method of Coutard and still others by special technics yet to be worked out.

3. *Increasing Appreciation of the Place of Preoperative Irradiation.*—That preoperative irradiation is still in its experimental stages, few will deny. Perhaps it is still too soon to include it as one of the important advances in the present state of our knowledge. Nevertheless, the method is growing rapidly in favor of the surgeon and there is evidence that its use is beginning to rest on a scientific basis. For example, the benefits to be derived from preoperative irradiation are minimal when the operation follows immediately or very soon after the irradiation and are maximal when thorough irradiation is followed by a sufficient delay for tumor regression to become maximal. The ability to draw such conclusions is argument for the thesis that preoperative irradiation is entering on a scientific phase, even though it is not yet known exactly how much effect it will have on the five-year cure statistics.

4. *Decreasing Emphasis on Postoperative Irradiation.*—The routine employment of postoperative irradiation has always rested on unscientific thinking. Too often the wish has been father to the thought. It may comfort the patient or his family to hear the surgeon say "There now, I have removed practically all of the cancer. If I have left a few cancer cells, the radiologist can take care of them with a shotgun dose of x-rays." To the thinking radiologist it has often seemed that since radiologic cure rests on tumor cell sensitivity and tissue response to irradiation rather than on the numerical count of tumor cells, the radiologist who can "take care of the residual tumor cells" after a surgical operation might have taken equally good care of the entire tumor, especially in view of the fact that his aim is better and his therapy less hindered when he is treating a tangible tumor, not an intangible ghost. I am not advocating the complete scuttling of all forms of postoperative irradiation in every case. Neither am I advocating the abandonment of surgery in favor of irradiation in carcinoma. I do feel, however, that the decreasing emphasis on routine postoperative irradiation is evidence of progress, toward the substitution of correct thinking for poorly founded superstition.

UNSOLVED PROBLEMS FOR THE FUTURE

1. *Will the Use of Higher Voltages and Thicker Filters (i. e., Shorter Wavelengths) Increase the Percentage of Five-Year Cures?*—Not long ago, physicists were fairly unanimous in the opinion that the only benefits to be derived from shortening the wavelength, so far as cancer therapy is concerned, are envisaged in the possible increase of the penetration (percentage depth dose). They had ascertained that the increased penetration through metals, obtainable by the use of supervoltages and thicker primary filters, was not accompanied by increased penetration through tissue, beyond a certain easily reached point. Avoiding complicated data and mathematical analyses, one may

7. Duffy, J. J.; Arneson, A. N., and Voke, E. L.: The Rate of Recuperation of Human Skin Following Irradiation, Radiology **23**: 486 (Oct.) 1934.

8. Coutard, Henri: Zusammenfassung der Grundlagen der röntgentherapeutischen Technik der tiefgelegenen Krebse, Strahlentherapie **37**: 50, 1930. Roentgen Therapy of Epitheliomas of the Tonsillar Region, Hypopharynx and Larynx from 1920 to 1926, Am. J. Roentgenol. **28**: 313 (Sept.) 1932. Miescher, G.: Gegenwärtige Methoden der Krebsbestrahlung und ihre Erfolge: I. Einmalige Höchstdosis, Strahlentherapie **37**: 17, 1930. Schinz, H. R.: Gegenwärtige Methoden der Krebsbestrahlung und ihre Erfolge: II. Verteilte Dosis, ibid. **37**: 31, 1930. Schwarz, G.: Ueber die theoretischen und praktischen Grundlagen einer Lang-schwach-Bestrahlungsmethode, ibid. **37**: 709, 1930. Borak, J.: Ueber die epidermolytische Bestrahlungsreaktion, Fortschr. a. d. Geb. d. Röntgenstrahlen **45**: 397 (April) 1932.

9. Ginsburg, S.: Bone Metastasis in Thyroid Tumors: Early Diagnosis and Radiotherapy, Am. J. Roentgenol. **18**: 203 (Sept.) 1927.

sum up their observations about as follows: "Desired increases of the percentage depth dose can be obtained by increase of the distance between patient and x-ray tube and by elaboration of the principle of 'cross-fire.' We are already operating with percentage depth doses near the maximum obtainable in the animal body. The degradation of the x-ray beam (synonyms: 'softening,' 'increase of wavelength') through Compton effect becomes such a large factor at higher voltages that the gain is little or nothing. In short, there is no physical basis for undertaking to treat patients with costly and troublesome million-volt x-ray apparatus."

Such analyses as the foregoing are valuable but incomplete. Before one is justified in deciding that nothing is to be gained by the use of extremely high voltages, certain additional questions must be answered: 1. X-ray beams generated at voltages of a million or so may not differ markedly in penetrating power from conventional present day x-ray beams, but they ionize the atoms in the irradiated tissue according to a definitely different pattern. Is this significant? 2. Irradiation at "supervoltages" includes bombardment of the tissues with neutrons, highly penetrating particles which are practically absent from conventional present-day x-ray beams. May these not prove to be of some value or are they wholly valueless or even harmful? 3. Some of the radiologists who have had a wide experience with external irradiation by both x-rays and radioactive substances are of the opinion that gamma rays are superior to x-rays for the treatment of cancer. This has by no means been proved, but if it is so it is not because of any superiority in penetration, expressed in terms of the percentage depth dose. As a matter of fact, no radiologist in the world today has sufficient radium at his command to permit a practical technic at depth doses as great as are readily attained with conventional x-ray beams. Assuming that gamma rays are actually more efficacious than the x-rays in cancer therapy, it would follow that in spite of an inferior percentage depth dose the gamma ray beam has a greater specificity for the tumor cells; i. e., damages the tumor cells more, the normal tissues less. If this belief in a demonstrable superiority of gamma rays is superstition, as some believe, there is little reason to think that "million volt x-rays" will prove superior to present-day practice. But suppose it turns out otherwise. The question must remain, for the present, unanswered.

2. Can Surgery Prevent the Late Recurrences of Tumors That Have Apparently Completely Regressed?—Perhaps, before enough years have passed for this question to be answered, the real and final answer to the cancer problem will have been given. In the meantime one can only plead for complete records and honest analyses of the results of various combinations of irradiation and surgery. For the present, this question must also remain unanswered.

CONCLUSION

Modern concepts of roentgen therapy in cancer do not permit one to continue any fancied rivalry of twenty years ago between radiation therapy and surgery. Today the radiologist and the surgeon stand face to face, each in need of the other's help, each ready to do his proper share of the work of combating cancer.[10] The radiologist is just as anxious to avoid taking human life by depriving a patient of the benefits of properly indicated surgery as the surgeon is anxious to avoid the futile multilation of a patient who might better be treated by irradiation. Their brotherhood is made more complete by their common knowledge that neither has the final answer to the cancer problem: that real cooperation between physician, surgeon, pathologist and radiologist constitutes the best armamentarium in the present-day battle with cancer.

3401 North Broad Street.

10. Holfelder, Hans: Comparison of Medical, Surgical and Radiological Conceptions in Relation to the Treatment of Disease, Brit. J. Radiol. **5**: 39 (Jan.) 1932.

ETIOLOGY OF CANCER

A PARTIAL REVIEW

LLOYD F. CRAVER, M.D.
NEW YORK

Modern pathology reveals that cancer is not a single disease but a multitude of different diseases and that the boundary between malignant and benign is not everywhere sharply defined. Not much can be said about that aspect of the etiology of cancer which has to do with the fundamental nature of the disease, for that is bound up with the very nature of the growth process itself, about which little is known. Therefore this paper will be restricted chiefly to a consideration of those extraneous factors which may act on cells and tissues in such a way as to produce cancer.

The multiplicity of the cancer process is indicated not only by its widely varying forms but also by the great number of factors that have already been discovered to be capable of affecting tissues, apparently previously normal or predisposed by some anatomic variation, and inciting them to form malignant tumors. Cohnheim's theory accounts for the source of certain tumors, but the great majority may be attributed to the effects of chronic irritation on adult tissues.

That cancer in man is not a germ or virus disease is the accepted belief of all competent students of the problem. That diet has any general relation to the etiology of cancer may safely be denied, nor does it appear likely that the excess or deficiency of any one chemical substance, hormone, or vitamin will be found to be a universal "cause of cancer." This is not to be taken to deny that in specific organs or tissues, under certain conditions, diet, chemicals or hormones may be important contributing or even more direct etiologic factors.

Syphilis probably does not foster the development of cancer in any general sense but only in certain locations, such as the tongue, where syphilitic glossitis and leukoplakia may form the basis for multiple carcinomas.

Tuberculosis was formerly believed to offer a certain antagonism to cancer. Yet there is a good percentage of cases of epithelioma on the basis of lupus, and cancer of the lung may develop in the walls of tuberculous cavities. Tuberculosis is a fairly common complication in cancer patients.

In a recent paper on the relation of trauma to malignant tumors Ewing[1] has reaffirmed the teaching that a single trauma of normal tissues is incapable of producing a malignant tumor. He grants that trauma may

From Memorial Hospital.
Read before the Section on the Practice of Medicine at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 13, 1935.

1. Ewing, James: Causation, Diagnosis and Treatment of Cancer, Beaumont Foundation Lectures, Series 10, Baltimore, Williams and Wilkins Company, 1931; The Prevention of Cancer, in Congreso internacional de lucha cientifica y social contra el cáncer, Sección social, Madrid, S. A. Blass, 1933, pp. 99-114; Modern Attitude Toward Traumatic Cancer, Arch. Path. **19**: 690 (May) 1935.

be an important indirect determining cause of certain tumors but in such cases finds that additional factors, such as delayed healing, infection, chronic irritation and probably hereditary and local predisposition, are at work. The production of tumors in experimental animals by trauma occurs only under special conditions of inherited or induced susceptibility, quite without parallel in man. Strict adherence to the criteria emphasized by Ewing successfully nullifies practically all claims of traumatic cancer in man.

AGE AND SEX

Pack's [2] study of age and sex distribution and incidence of nearly 20,000 tumors showed that the risk of certain tumors developing at various ages is different from what is popularly supposed. For example, the incidence of sarcoma of various kinds differs only slightly from age 20 to age 80, when one takes into account the numbers of persons actually living at different ages.

HEREDITY

While, in general, cancer in man does not appear to be influenced by a genetic factor, there are particular types of tumors that undoubtedly have a hereditary basis, such as neurofibromatosis, entailing a certain risk of neurogenic sarcoma, gliomas of the retina, multiple skin cancer on the basis of xeroderma pigmentosum, osteogenic sarcoma on the basis of multiple enchondromas and exostoses.

A history of the occurrence of cancer more frequently in families of cancer patients is usually interpreted as indicating a combination of factors such as age, occupation, habits, and anatomic or physiologic peculiarities, rather than a true inheritance of susceptibility or resistance to cancer.

Lacassagne [3] has shown recently that the development of mammary cancer in mice treated by injections of estrogenic substance is dependent on a hereditary factor determining the susceptibility of the breast to estrogenic substance.

Slye's work on heredity of various tumors in mice is usually looked on as having little importance in regard to human cancer.

Certain observations on the occurrence of cancer in human twins are of interest at this point. It has been noted that, when a tumor occurs in one of a pair of homologous twins, in a high proportion of cases the other member of the pair develops, at about the same age, a tumor which in general is of the same type, in the same organ, or in an ontogenetically related organ. Murphy [4] looks on these observations as speaking strongly in favor of a genetic control, while Versluys [5] concludes that, except for determining the site, hereditary factors play a very small rôle in the development of tumors.

IRRITANTS

A long list of agents of different classes has been demonstrated, however, to be definitely capable of acting on tissues to cause chronic irritation or growth stimulus in such a way as to produce cancer.

In the electromagnetic spectrum all wavelengths lying in the range between heat, near one extreme, and gamma rays, near the other extreme, are found to cause chronic tissue reactions that may eventuate in malignant tumors. Repeated exposure of the skin to heat, as in wearers of the kangri box in India or the kairo box in Japan, in iron molders or in English locomotive firemen, may produce a chronic dermatitis that forms the basis for epithelioma. A single burn sufficient to leave a scar, particularly in areas in which the scar is subjected to repeated fissuring or trauma, may eventually lead to cancer of the skin. The age of the scar is more important than the age of the patient. Hot pipe stems may cause cancer of the lip. A habit of drinking hot tea may be responsible for cancer of the esophagus in some cases.

Sunlight has been shown to be a causative factor in cancer of the exposed parts of the skin, as in sailors and farmers. In Australia, Molesworth [6] finds that cutaneous cancer is more common in the white race and in the albino natives. The ultraviolet rays may be mainly responsible, but Carozzi [7] believes that the visible spectrum may be injurious. The carcinogenic action of sunlight is startlingly evident in xeroderma pigmentosum. In certain cases of melanoma, sunlight has apparently been the chief irritant of a mole. A protruding lower lip is liable to sunburn and may thus be more likely to develop epithelioma. Epithelioma of the skin of animals has been produced by exposures to ultraviolet rays.

The rôle in carcinogenesis of the Gurwitsch mitogenic rays lying in the ultraviolet band from about 1,900 to 2,400 angstrom units is still largely speculative. Cancer of the skin resulting from radiodermitis, particularly on the hands of pioneer roentgenologists and radium therapeutists, is only too well known. Radiation cancer is also seen frequently as a result of overenthusiastic superficial irradiation as for psoriasis, pruritus ani and facial hypertrichosis. Sarcomas have been produced in experimental animals by exposing them to x-rays.

A new etiology for bone sarcoma in man appeared in dramatic fashion in the painters of radium dials, who, by moistening their brushes in their mouths, ingested appreciable amounts of radium and mesothorium. These substances were deposited, similarly to lead, in the bones, which then became subjected to a ceaseless bombardment from within, chiefly by alpha particles. Those who survived the earlier effects, anemia and necrosis of the jaws, were doomed to die years later of osteogenic sarcoma. The Schneeberg and Joachimstal cancer of the lungs in miners is now attributed mainly to the inhalation of emanations of radioactive minerals.

Animal parasites lead in man and lower animals to a variety of chronic irritations that produce cancer. Bilharzia infestation of the bladder is known to be followed by cancer of that organ in a good proportion of cases. Ewing has found trichinae in a number of cancerous tongues. Fibiger demonstrated that spiroptera carried by cockroaches were responsible for carcinoma in the stomach of rats. Several other kinds of parasites have been found associated with tumors of lower animals.

Chemicals.—Since the recognition of chimney sweeps' cancer by Percival Pott in 1820, a long list of chemical

2. Pack, G. T., and LeFevre, R. G.: The Age and Sex Distribution and Incidence of Neoplastic Diseases at the Memorial Hospital, New York City, J. Cancer Research **14:** 167-294 (June) 1930.

3. Lacassagne, A.: Apparition de cancers de la mamelle chez la souris mâle, soumise à des injections de folliculine, Compt. rend. Acad. de sc. **195:** 630-632 (Oct. 10) 1932; Compt. rend. Soc. de biol. **115:** 937-939, 1934. Lacassagne, A., and Nyka, W.: À propos d'une pathogénie de l'adénocarcinome mammaire: recherche de la folliculine dans le colostrum, ibid. **116:** 844-845, 1934.

4. Murphy, J. B.: Experimental Approach to the Cancer Problem, Bull. Johns Hopkins Hosp. **56:** 1-31 (Jan.) 1935.

5. Versluys, J. J.: Zwillingspathologischer Beitrag zur Aetiologie der Tumoren, Ztschr. f. Krebsforsch. **41:** 239-259, 1934.

6. Molesworth, E. H.: Die Aetiologie und Zellpathologie des Haut- und Lippenkrebses in Australien, Dermat. Wchnschr. **99:** 945-951 (July 21) 1934.

7. Carozzi, L.: Le cancer professionnel, in Congreso internacional de lucha científica y social contra el cáncer, Sección social, Madrid, S. A. Blass, 1933, pp. 3-59.

irritants has been gradually accumulated, the effects of which have been noted chiefly on the skin of man clinically, or in the laboratory on the skin of animals. Scarlet red and other lipoid solvents of the aniline series, fats, fatty and mineral acids, indole and skatole fall into this category. The prolonged administration of arsenic may be followed after several or many years by a pathognomonic type of multiple warty keratoses of the palms and soles, and multiple keratoses elsewhere on the skin, a condition which not infrequently serves as the basis for multiple epitheliomas. Arsenic has been suspected also of being cancerigenic in tissues other than the skin; for example, in the lungs of the Schneeberg miners.

In the aniline industry, in workers with the intermediate products and derivatives of benzene, toluene, xylene, naphthalene, anthracene and phenanthrene, there is an incidence of cancer of the bladder of from 4 to 5 per cent. These tumors may appear at any time after two years of exposure. In many cases the tumors are multiple, and studies of pathogenesis suggest that the compounds are absorbed mainly through the respiratory tract and may affect the basal layers of the mucous membrane of the bladder through circulation in the terminal capillaries. According to Ferguson,[8] all efforts to demonstrate carcinogenic agents in the urine of aniline workers have failed. The compounds that are believed to be responsible are aniline, alpha and beta naphthylamine, and benzidine.

Janssen[9] reports the occurrence of cancer of the bladder in patients who had been treated with tar over long periods for psoriasis.

A vast amount of experimental work has followed the discovery by Yamagiwa and Ichikawa in 1915 that cancer could be produced in the skin of rabbits' ears by applying tar. Many of the higher distillation components of tar, which have been found to be the agents responsible for its carcinogenic properties, have been chemically isolated, identified and prepared synthetically. Loeb[10] has named seven of the principal carcinogenic hydrocarbons, and he states that in general a molecular structure consisting of rings attached to the 1:2 and 5:6 position of the anthracene ring system tends to induce a marked carcinogenic activity.

These agents apparently produce cancer by acting on normal cells, as stimulants of growth, and need not cause local irritation. Evidence has been adduced to show that a general, possibly specific, intoxication of the animals plays a part in the production of cancer by tar derivatives.

RELATION OF TAR DERIVATIVES TO HORMONES AND STEROLS

One of the most interesting recent developments, and perhaps one of epochal importance, is the recognition of the fact that these carcinogenic hydrocarbons are closely related by chemical structure to a series of substances that are of common occurrence in the body and of great importance biologically; namely, bile acids, cholesterol, ergosterol, vitamin D, the testis hormone and particularly the estrus producing and possibly the luteal hormone. This recognition has led naturally to the suggestion by Kennaway and Cook that under some conditions the sterols normally present in the body might undergo such a chemical alteration as to become carcinogenic. Moreover, it has been found that some of the carcinogenic derivatives of tar are capable of producing estrus in castrated rats and mice. This leads to a consideration of the influence of hormones in carcinogenesis. Choriocarcinoma was attributed years ago by Pick to stimulation of the chorionic cells by excessive secretion of corpus luteum cysts. Early castration of female mice belonging to strains having a known high incidence of mammary cancer reduces the cancer rate to zero or nearly so. Lacassagne has succeeded, by injecting large doses of an estrogenic substance,[11] in producing mammary cancer in male mice, belonging to the R 3 strain of the Radium Institute of Paris—a strain which regularly develops 72 per cent of mammary cancer in females but none in males. Bagg produced a high incidence of mammary cancer in mice by rapid breeding and removal of the litter to prevent suckling. These experiments were undertaken primarily to test the theory of stasis in breast ducts as a cause of cancer, and their results seemed to favor that theory. It appears likely, however, that a hormonic stimulation through excessive ovarian secretion may have played a large and perhaps dominant rôle in the results. Lacassagne has reported the presence of estrogenic substance in human colostrum and in cyst fluid from the breast of a woman with mammary cancer.

Bagg, following the lead of Michalowsky,[12] injected zinc chloride into the testes of fowls and succeeded in causing the development of teratomas during the mating season. By treating these fowls also with injections of anterior pituitary-like substance, he has been able to obtain teratomas at other seasons. There is thus demonstrated experimentally the combined influence of hormonic stimulation and chemical irritation.

The presence of the follicle stimulating factor in the urine is found to accompany teratoma of the testis in man with remarkable constancy. Quantitative measurements of this hormone may even be used to predict which of five different histologic types of teratoma is present in a case that has not been influenced by treatment.

The hormone of the middle lobe of the pituitary, termed intermedin, has been shown to be associated in some way with melanoma.

Parathyroid adenomas have been found associated with osteitis fibrosa cystica, on the basis of which giant cell tumors of the bones frequently develop.

MISCELLANEOUS DATA

I shall now briefly survey some of the miscellaneous data regarding cancer of various organs.

In the skin, numerous types of abnormalities may be precancerous: pigmented moles, oily or dry skin, sebaceous cysts, scars of lupus or burns, and various chronic ulcers.

In the mouth, avoidance of syphilis, tobacco and jagged teeth would largely prevent intra-oral cancer. Betel nut or buyo cheek cancer of the orient may be attributed to a combination of lime, cheap tobacco and irritation caused by particles of the betel nut and the essential oils of the buyo leaves. Electrochemical processes between dissimilar metallic dentures may be a factor in the causation of some intra-oral cancers.

8. Ferguson, R. S.: Pathologic Physiology of Teratoma Testis, J. A. M. A. **101**: 1933-1937 (Dec. 16) 1933. Ferguson, R. S.; Gehrmann, G. H.; Gay, D. M.; Anderson, L. W., and Washburn, V. D.: Symposium on Aniline Tumors of the Bladder, J. Urol. **31**: 121-171 (Feb.) 1934. Ferguson, R. S.: Clinical Evaluation of the Quantitative Excretion of Prolan A in Teratoma Testis, ibid. **31**: 397-409 (March) 1934.

9. Janssen, P.: Die Chirurgie der Harnblase, in Handbuch der praktischen Chirurgie, Stuttgart, Ferdinand Enke, **4**: 884, 1927.

10. Loeb, Leo: Estrogenic Hormones and Carcinogenesis, J. A. M. A. **104**: 1597-1601 (May 4) 1935.

11. Designated in the original paper "folliculine benzoate."

12. Michalowsky, I.: Das 10. experimentelle Zink-Teratom, Virchows Arch. f. path. Anat. **274**: 319-325, 1929.

In the esophagus, spasm, excessive heat of ingesta, or irritation by poorly masticated boluses of food, leading to spasm and esophagitis, or scars of peptic ulcers or caustic burns may lead to cancer.

Investigation that I made of the histories of cases of cancer of the stomach and esophagus by a very detailed inquiry into seventeen different postulated factors brought out an interesting discrepancy between the two diseases.[13] For cancer of the esophagus the factors attaining the higher scores were in the following order: tobacco, alcohol, small intake of water, poor condition of the teeth and lack of teeth. For cancer of the stomach the factors with the higher scores were poor teeth, lack of teeth, other gastro-intestinal diseases, heat of food and drink, irregularity of meals, lack of water, seasonings, use of cathartics, rapid eating, tobacco and alcohol. It may be noted, for example, that for cancer of the esophagus the abuse of tobacco and alcohol took first rank, while in the cases of gastric carcinoma these two factors took much less prominent places. The number of cases studied was too small to permit placing full reliance on such a discrepancy. The main value of the study lies in the demonstration of a clinical method of investigation of the etiology of cancer, a method not appealing perhaps to the experimentalist or to the enthusiast imbued with the notion of finding a universal cause or cure. There is still too little known about the exact clinical settings under which cancer arises in different organs.

In the large intestine, certain cancers are known to arise on the basis of adenomatosis, polyposis or ulcerative colitis. The colon is said to be the most common site of multiple malignant tumors. Ewing observes that "man is the only animal which enjoys unlimited access to food and suffers from restricted opportunity to empty the bowel, and he is the only animal that suffers notably from gastric and rectal cancer."

Cancer of the lung, apparently actually on the increase, mainly in industrial centers,[14] has been attributed to a change in the quality of atmospheric dusts, now laden with combustion products of gasoline and particles from tarred roads. Campbell[15] showed that mice inhaling dust from tarred roads developed an incidence of adenomas of the lungs ten times as great as the controls. Both radium emanations and arsenic are suspected of causing miners' cancer of the lung in Schneeberg and Joachimstal. The effects of respiratory infections, chronic bronchitis and bronchiectasis, and perhaps the influenza pandemic are possible factors in many cases of pulmonary carcinoma.

Aside from the cases in aniline workers the causes of cancer of the bladder are obscure. The American Urological Association's survey of 902 cases showed a low incidence of calculi but a high incidence of multiple tumors (29.2 per cent). This finding, coupled with the observation that has been made in workers in the aniline industry, namely, that there is a high incidence of subepithelial varices and that tumors begin frequently in the basal layers of the epithelium, suggests that carcinogenic agents circulating in the blood may be responsible for some tumors of the bladder.

Carcinoma of the penis is largely the result of chronic irritation due to uncleanliness, redundant prepuce and retention of smegma. It is almost unknown in the circumcised. Teratoma of the testis shows a remarkably higher incidence in undescended testes. Dean[16] estimates that the chances of an undescended testicle becoming teratomatous are from 47 to 273 times as great as those of a normal testis.

Carcinoma of the cervix uteri is notably infrequent in Jewish women, although in general it is commonly believed that birth injuries leading to lacerations, erosions and chronic cervicitis are largely to blame, since it is so regularly a disease of multiparas. Healy,[17] however, has stated that he is quite certain that there is an increasing number of cases in women under 35, many of whom have never conceived. Smith obtained a history of use of saponated solution of cresol douches in a large proportion of women with cervical cancer. An observation common to gynecologists is that cancer of the cervix is very rare in a completely prolapsed uterus, yet in such instances the exposed cervix is certainly subjected to repeated trauma and chronic irritation.

Carcinoma of the body of the uterus is found in single women four times as frequently as carcinoma of the cervix. It occurs mainly beyond the menopause. Carcinoma of the vulva is regularly found to have a basis of chronic changes in the epithelium of the vulva, such as leukoplakia, atrophy and fissuring.

In cancer of the breast, clinical observation shows a high proportion of histories of previous abnormalities of function, such as caked breast, abscess, sore nipples, interrupted nursing, miscarriages or complete lack of use of the breast. It is not at all infrequent in the clinic to note that a cancer of the breast is located in an area of mastitis peripheral to an old scar of incision for breast abscess. Such observations support the theory of irritation of breast and duct epithelium by retained secretions containing butyric and lactic acids and possibly more specific carcinogenic substances. Adair's[18] study of 200 women with mammary cancer showed a normal nursing history in only 8.5 per cent, while in 100 women without breast cancer 80 per cent gave a normal nursing history.

Cancer of the thyroid is known to begin practically exclusively in a diseased thyroid gland.

When osteogenic sarcoma occurs in patients over 50 years of age, in at least 28 per cent it is on a basis of Paget's disease.[19] It is questionable whether trauma may lead to the development of some of the bone-forming sarcomas. It seems likely in some cases that early disturbances, as by rickets, may play a part.

The lymphomatous processes cover a wide range of diseases, some of which, such as lymphosarcoma, are undoubtedly in general malignant tumors; others, such as Hodgkin's disease, are at present subject to dispute as to whether they should be classed with the neoplasms or with inflammatory diseases, and still others, such as acute leukemias, are considered by many to be atypical responses to infection. For most of the varieties of lymphoma one who has access to large numbers of cases could construct a spectrum passing from inflammatory conditions, by insensible gradations, through the typical processes and, beyond, to the highly malignant end of

13. Craver, L. F.: Etiology of Gastric and Esophageal Carcinoma, Am. J. Cancer **16**: 68-102 (Jan.) 1932.
14. Dissman, E.: Ueber die Häufigkeit des Bronchial- und Lungenkrebses in den Jahren 1925-1931, Ztschr. f. Krebsforsch. **36**: 563-571 (July 14) 1932.
15. Campbell, J. A.: Cancer of Skin and Increase in Incidence of Primary Tumours of Lung in Mice Exposed to Dust Obtained from Tarred Roads, Brit. J. Exper. Path. **15**: 287-294 (Oct.) 1934.
16. Dean, A. L.: Teratoma Testis, to be published.
17. Healy, W. P.: Experience with Radiation Therapy in Cancer of the Cervix, Am. J. Obst. & Gynec. **28**: 386-391 (Sept.) 1934.
18. Adair, F. E.: Epitheliomas of the Hand: Types and Treatment, S. Clin. North America **13**: 423-430 (April) 1933; Etiological Factors of Mammary Cancer in 200 Women, New York State J. Med. **34**: 61-68 (Jan. 15) 1934.
19. Coley, B. L., and Sharp, G. S.: Paget's Disease: A Predisposing Factor to Osteogenic Sarcoma, Arch. Surg. **23**: 918-936 (Dec.) 1931.

the scale. With such a variety, no doubt multiple causes are at work. Tuberculosis appears to have some definite but at present indefinable relation to Hodgkin's disease. Steiner,[20] using the Seibert tuberculin protein, finds in Hodgkin's disease a marked absence of sensitization to both avian and human tuberculin and explains this finding as indicating either that in Hodgkin's disease there occurs a desensitization to tuberculin or that Hodgkin's disease usually appears in persons in whom a normal reaction to tuberculin does not develop. He suggests that this finding may indicate some obscure relation between the two diseases. However, Uddströmer,[21] in a recent survey of the occurrence of Hodgkin's disease in Sweden from 1915 to 1931, states that he finds no support for the belief in an etiologic connection with tuberculosis. The reports of numerous investigations on the results of injections of material from Hodgkin's nodes into animals give conflicting evidence on the question of the etiologic relationship to tuberculosis. In the clinic it is difficult to avoid the feeling that Hodgkin's disease may arise on the basis of an atypical tuberculosis. Cases in which the two diseases coexist are by no means rare, and cases are seen not infrequently in which neither the clinician studying the patient nor the pathologist, looking at representative tissue specimens, can decide whether the disease is tuberculosis or Hodgkin's disease.

Lymphosarcoma and chronic lymphatic leukemia appear also to have some relation to tuberculosis. That the causative agent of these diseases in a large proportion of cases probably gains entrance to the body through the gastro-intestinal tract is indicated by increasing recognition of the frequency with which these diseases arise intra-abdominally. Büngeler[22] administered small doses of indole to mice over long periods and reported the subsequent development of leukemia, aleukemic myeloses, lymphadenoses and lymphosarcoma. Bernard[23] injected small amounts of tar into the femoral marrow of young white rats and reported the development of erythroleukemia.

It is impossible within the space allotted to do more than indicate briefly some of the widely varying causes of cancers. It seems impossible that such a multiplicity of inciting factors can ever be brought together and found to be operative only in conjunction with some universal growth stimulating substance. While attention has been focused on care of the cancer patient and on animal experimentation, the promising field of detailed clinical investigation of the etiologic factors of the major forms of cancer has been largely passed by. Thus, while many miscellaneous data are at hand, there remains a great need for expansion of our knowledge of the exact conditions under which malignant tumors appear. The opportunity for such investigations will increase as the study and treatment of cancer becomes recognized as a specialty and as more cases are concentrated in special cancer hospitals and tumor clinics.

Central Park West at One Hundred and Sixth Street.

20. Steiner, P. E.: Hodgkin's Disease; Search for Infective Agent and Attempts at Experimental Reproduction, Arch. Path. **17**: 749-763 (June) 1934; Etiology of Hodgkin's Disease: Skin Reaction to Avian and Human Tuberculin Proteins in Hodgkin's Disease, Arch. Int. Med. **54**: 11-17 (July) 1934.

21. Uddströmer, M.: On the Occurrence of Lymphogranulomatosis (Sternberg) in Sweden 1915-1931, and Some Considerations as to Its Relation to Tuberculosis, Acta tuberc. Scandinav., supp. 1, pp. 1-225, 1934.

22. Büngeler, W.: Die experimentelle Erzeugung von Leukämie, aleukämische Myelosen, Lymphadenosen und Lymphosarkom, Klin. Wchnschr. **11**: 1982-1984 (Nov. 26) 1932; Frankfurt. Ztschr. f. Path. **44**: 202-271, 1933.

23. Bernard, J.: L'érythro-leucémie expérimentale provoquée par le goudron, Sang **8**: 28-38, 1934.

RELATION OF LEUKEMIA OF ANIMALS TO LEUKEMIA OF MAN

JACOB FURTH, M.D.
HENRY W. FERRIS, M.D.
AND
PAUL REZNIKOFF, M.D.
NEW YORK

Many of the recent contributions to the knowledge of leukemia and related diseases have come through experimental studies in animals. This report is a review of some of these contributions and an attempt to correlate them with the human disease.

LEUKEMIA OF MICE AS A NEOPLASTIC DISEASE[1]

Leukemia of a mammal (guinea-pig) was first transmitted by Snyders, but most of the experimental studies that established the neoplastic nature of this disease were made with the leukemias of mice.

Leukemia of mice, both lymphoid[2] and myeloid,[3] is transmissible to healthy individuals of the same species. Transmission is successful only with live leukemic blood cells, and the inoculum loses its ability to transmit the disease when subjected to such procedures as glycerination and desiccation in the frozen state, which injure live cells while they do not destroy viruses and microorganisms. Cell-free extracts fail to transmit the disease.

The source of the leukemic blood cells does not appear to influence transmissibility, and transmission is readily accomplished with a suspension of apparently any organ infiltrated by the immature cells. Leukemic blood cells readily transmit the disease, but cell-free plasma does not.

Carcinoma and sarcoma of mice can likewise be passed from one animal to another only by means of live tumor cells. The transfer of leukemia is essentially a graft of immature blood cells from leukemic to healthy mice. The blood forming organs of the recipient play no active part in the development of leukemia following the inoculation. Indeed, the disease may be transmitted to mice whose normal blood forming organs have been destroyed by massive doses of x-rays preceding the inoculation. Mice thus treated may die before the normal blood forming organs injured by the x-rays undergo regeneration. The duration of the disease in irradiated mice is the same or somewhat shorter than in mice not irradiated. Potter and Richter[4] traced the lymphocytes that infiltrated the various organs to those introduced, by means of microscopic studies, at various intervals after subcutaneous inoculation.

Transmission of some strains of leukemia is successful only in closely related mice; others may also be transmitted to unrelated mice. The factors that deter-

From the New York Hospital and the Departments of Pathology and Medicine, Cornell University Medical College.
Read before the Section on Practice of Medicine at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 13, 1935.

1. This section was read by one of us (J. F.) before the American Association for Cancer Research, April 17, 1935.

2. See references in Furth, Jacob; Seibold, H. R., and Rathbone, R. R.: Experimental Studies on Lymphomatosis of Mice, Am. J. Cancer **19**: 521 (Nov.) 1933.

3. Furth, Jacob: Transmission of Myeloid Leukemia: Its Relation to Myeloma, J. Exper. Med. **61**: 423 (March) 1935. Parsons, L. D.: Leukemia Coincident with and Transmissible by a Spindle-Celled Sarcoma in the Mouse, J. Path. & Bact. **40**: 45 (Jan.) 1935.

4. Potter, J. S., and Richter, M. N.: Mouse Leukemia: VIII. Continuity of Cell Lineage in Transmission Lines of Lymphatic Leukemia, Arch. Path. **15**: 198 (Feb.) 1933.

mine the success of inoculation are similar to those that determine the fate of a tumor transplant.

The disease produced by intravenous inoculation has the character of the systemic disease leukemia and is indistinguishable from the spontaneous disease. After subcutaneous injections the immature blood cells form, with rare exceptions, tumors at the site of introduction.

The type of disease produced depends on numerous factors, of which the character of the malignant blood cells is most important. Each of nine strains of lymphatic leukemia studied in our laboratories showed individual characteristics that were retained through numerous animal passages, with only slight modifications such as occur among other transmissible neoplasms.

Morphologically the strains of lymphatic leukemia studied differ as to the size, shape, basophilia of the malignant lymphocytes, presence or absence of azure granules and of vacuoles, and fragility as revealed by the presence of smudged (crushed) cells in dry smears prepared in a uniform manner. The malignant cells of the two strains of transmissible myeloid leukemia observed differ with respect to the size of the cells and to the number and size of the granules they contain. Individual cells of different strains cannot always be differentiated from one another morphologically, but groups of cells derived from different strains can usually be distinguished.

Far more numerous are the differences among the transmissible strains of leukemia, revealed in transmission experiments, such as localization and intensity of infiltrations, ability to produce tumors, and the ease of transmissibility to related and unrelated mice.[2]

It is evident from these studies that the leukemic blood cells of mice are not common immature blood cells; they are malignant cells with characteristics of their own.

Several agents that may produce leukemia in mice have been described, such as indole (Bungeler[2]), benzene (Lignac[5]), and x-rays (Krebs, Wagner and Rask-Nielsen[2] and Furth[6]). Krebs and his associates observed leukemia six times more often among mice that were irradiated than among their unirradiated controls. It is noteworthy that these studies on the production of leukemia by x-rays and benzene have followed observations on human beings suggesting the causation of some cases of leukemia by these agents. In our laboratories mice have been irradiated by massive doses of x-rays at the age of from 2 to 3 months. From six to eighteen months later many of them developed one of three types of neoplasm: (*a*) mediastinal lymphosarcoma with or without generalized lymphomatosis, (*b*) myeloid leukemia, and (*c*) ovarian tumors. The incidence of these diseases was approximately ten times greater among irradiated mice than among their unirradiated siblings. Two cases of myeloid leukemia occurring in irradiated mice proved to be transmissible.[7] The transmitted disease was indistinguishable from the spontaneous.

The inference can be drawn from these observations that leukemia, like cancer, can be produced by chemical or physical agents; leukemia produced by x-rays can be transmitted from diseased to healthy animals.

The strains of transmissible leukemia studied have a period of latency of from three weeks to three months, during which the animals appear healthy, while the malignant blood cells introduced by the intravenous route multiply in the blood forming organs. Victor[8] found very recently that this period of latency also exists in the spontaneous disease, demonstrable by changes in the respiratory metabolism of lymph nodes and by transmission experiments made with lymph nodes removed from mice during this period.

In summary, variations in the course and anatomic manifestations of leukemia of mice are determined by several factors. Some are intrinsic and are determined by the constitution of the host and of the malignant blood cells. Others are extrinsic, such as the site of origin or entry of the malignant cells, the possibility of their free discharge into the circulation, and the numerous factors that influence the resistance of the host.

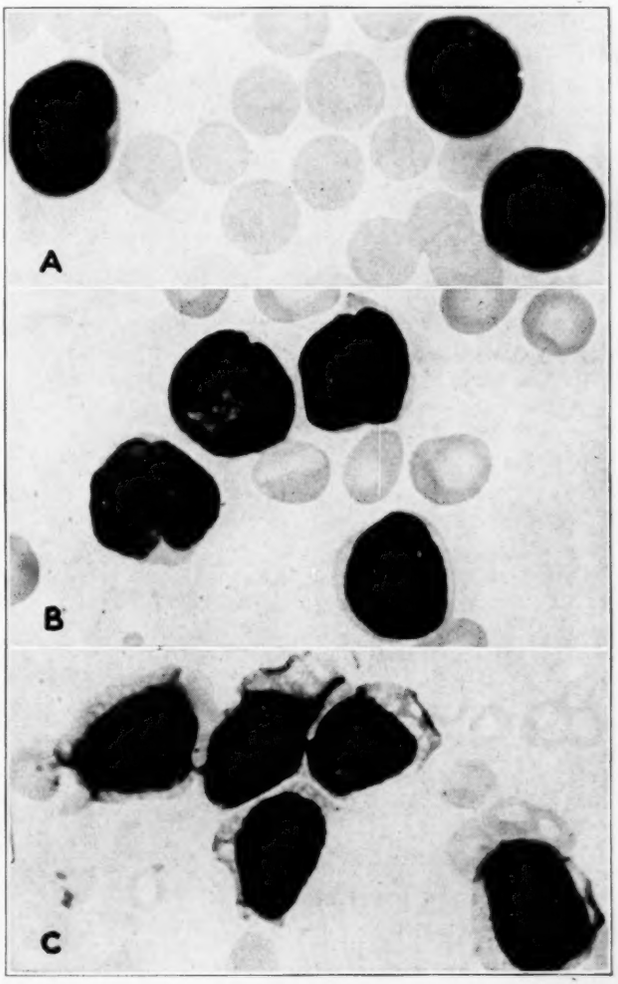


Fig. 1.—Lymphoid leukemia; lymphocytes in the circulating blood. *A* and *C* are from mice; *B* is from child J. P.

THE SIMILARITY OF LEUKEMIA OF MAN TO THAT OF THE MOUSE

Experimental studies indicate that leukemia of mice is a neoplastic disease. How closely does leukemia of man resemble the disease of the mouse, and is one justified in considering it also as neoplastic in nature?

The anatomic manifestations of the various types of leukemia in mice resemble so closely those in man that no essential difference has been found between the two by workers familiar with both. Despite this evidence,

5. Lignac, G. O. E.: Die Benzolleukämie bei Menschen und weissen Mäusen, Klin. Wchnschr. **12**: 109 (Jan. 21) 1933.
6. Furth, Jacob: Transmission of Myeloid Leukemia in Mice, Proc. Soc. Exper. Biol. & Med. **31**: 923 (May) 1934.
7. Furth, Jacob, and Barnes, W. A.: Unpublished work.
8. Victor, J.: Personal communication to the authors.

however, some observers familiar with the human disease are skeptical as to a similarity. It has therefore appeared worth while to make a detailed comparative study of the leukemias and related conditions in these two species. For this purpose we have studied twenty-five cases of leukemia (ten lymphoid and fifteen myeloid), ten cases of lymphosarcoma and three cases of myeloma which came to postmortem examination. The material of mouse leukemia has come from the experiments performed in our laboratories.

In all instances of myeloid leukemia of both man and mice studied by us, the normal bone marrow is extensively infiltrated by immature myeloid cells which show disturbed or arrested maturation to normal polymorpho-

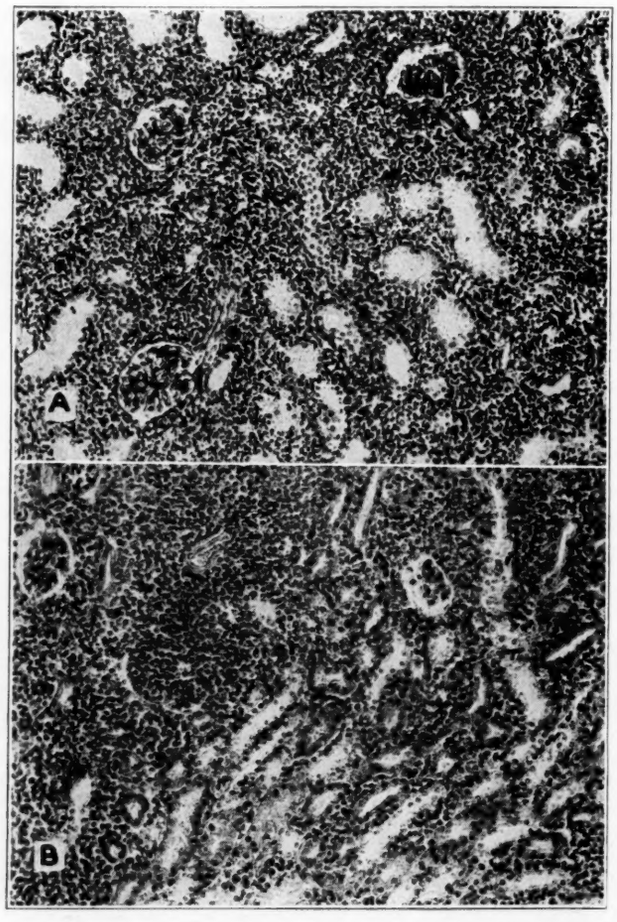


Fig. 2.—*A*, extensive infiltrations in the kidney in lymphoid leukemia of man; *B*, same in the mouse.

nuclear leukocytes. Through the bony canal system the immature blood cells may spread to the periosteum and surrounding tissue in both man and the mouse. The pulp of the spleen becomes densely packed with similar cells in the two species. The involvement of lymph nodes occurs less often and is less conspicuous in myeloid than in lymphoid leukemias, whether of man or of mouse. The infiltrations in the liver are either portal or diffuse (fig. 3) or both. Small tumors composed of immature myeloid cells may occur in both man and the mouse in numerous locations; e. g., skin, bones and liver. The type of cell that forms infiltrations or tumors in the various organs is usually the same in the same case but may be different in different cases, whether in the mouse or in man. Mitotic figures are occasionally seen among the immature blood cells.

The same observations apply to lymphoid leukemia. Enlargement of lymph nodes almost invariably occurs in lymphoid leukemia of both species. The extension of infiltrations beyond the capsule occasionally found in this disease (fig. 6) induced many pathologists to regard lymphoid leukemia as a neoplastic disease. Lymphoid leukemia may occur with or without tumor formation, and there are transitional forms between lymphosarcoma and lymphoid leukemia in both species. Lymphosarcoma terminating in lymphoid leukemia (so-called leukosarcoma) is known to occur in both man and the mouse.

Figures 1 to 7 illustrate the similarity of the changes in various organs in the leukemias of man and the mouse. Indeed it is often difficult, if possible at all, to tell from which species the photomicrographs were prepared.

Evidence of inflammation or degeneration is either secondary or absent. Leukemia occurs in small numbers of individuals in any population of mice or human beings and does not spread from affected to healthy individuals, although it is fatal in both species.

Any type of cell that is capable of multiplication may, from the theoretical standpoint, produce a neoplasm, and immature blood cells should be no exception. The fact that leukemic cells circulate in the blood stream is not opposed to the concept that they are neoplastic in nature, since they may be found in the tissues in large numbers, often forming discrete nodules. Moreover, in animals, leukemic cells from the blood may form distinct tumors when placed in the subcutaneous tissue.

Ewing[9] quotes several definitions of neoplasia, applicable to the leukemias of mice. In view of the close similarity between mouse leukemia and that of man, is it not logical to consider the human disease as also neoplastic?

THE RELATION OF ACUTE TO CHRONIC LEUKEMIA

It is now generally accepted that the human disease is the result of an overgrowth of immature blood cells in the blood forming tissues, with secondary invasion of the circulating blood. It is believed by some that this overgrowth of immature blood cells may result from an acute infection[10] and progress rapidly: therefore, the disease is called acute. Chronic leukemia, notably the lymphoid, is regarded by most workers as probably neoplastic in nature.

Experimental studies of the animal diseases have shown that there is no essential difference between acute and chronic leukemia. The first generations of the disease produced by transmission often have a chronic course of from one to three months. During repeated passages the virulence of most strains increases so that the experimental disease may terminate fatally within a week. Lymph node and splenic enlargements are usually considerable in the chronic disease but slight in the acute variety. Some transmissible strains remain chronic; others follow a rapid course after isolation and are often associated with extensive hemorrhages and sudden prostration, suggesting an acute infection. Nevertheless, in transmission experiments, both the acute and the chronic cases behave like neoplasms; the anatomic changes are essentially the same in the two, transmission being dependent on the presence of live immature blood cells in the inoculum.

9. Ewing, James: Neoplastic Diseases, ed. 3, Philadelphia, W. B. Saunders Company, 1928, p. 25.

10. Ordway, Thomas; Gorham, L. W., and Beebe, R. T.: Oxford Medicine, New York, Oxford University Press **2**: 683, part 2, 1933.

A postmortem study of the human cases likewise fails to reveal criteria by means of which the disease could be divided in two different varieties; namely, acute and chronic. This classification, accepted by many textbooks of pathology and medicine, found its origin in clinical studies but is not substantiated by anatomic studies of our material. In the cases of clinically acute leukemia that came to postmortem examination the changes in the bone marrow were similar to those of chronic leukemia. The infiltrations in other organs were slight or moderate in a few cases of clinically acute disease, but in the majority of cases they were as conspicuous as in the chronic disease. In one case studied through the courtesy of Dr. Jacob Werne, there was a fulminating necrotizing infection of the pharynx and larynx which caused death after an illness of apparently one week's duration, but the postmortem examination revealed extensive leukemic infiltration in the bone marrow, spleen and lymph nodes. Interference with normal leukocyte formation may explain the poor resistance to infection. Stasis of immature blood cells in the capillaries, interference with megakaryocyte formation and the low platelet count may explain the hemorrhagic diathesis,[11] which is often associated with leukemia.

TABLE 1.—*Duration of Symptoms in Eighteen Cases of Acute or Subacute Leukemia*

Duration of Symptoms	Judged by Patient, Cases	Judged by Careful History, Cases
2 weeks or less	4	0
2 weeks to 1 month	5	1
1 month to 2 months	4	1
2 months to 4 months	1	3
4 months to 6 months	2	2
6 months to 1 year	2	3
1 year to 2 years	0	5
More than 2 years	0	3

TABLE 2.—*The Range of Temperature in Leukemia*

	Number of Cases	
	Acute	Chronic
Normal	3	8
37.5 to 38 C.	9	7
38 to 39 C.	5	11
Above 39 C.	7	3

TABLE 3.—*Frequency of Infection of the Upper Respiratory Tract* *

	Acute Leukemia	Chronic Leukemia
Number of cases with evidence of inflammation	9	10
Number of cases with no evidence of inflammation	15	19

* The analysis of clinical symptoms and signs (tables 1-3) includes also cases that were not examined post mortem.

Experimental leukemia, both acute and chronic, is preceded by a period of latency, dating from the time of inoculation until the onset of symptoms, during which the animal appears healthy. The sudden termination of the disease, although it may resemble or be associated with an infection, occurs in mice whose blood forming tissues, usually bone marrow, have been largely replaced by the malignant blood cells during the period of latency.

11. Hamburger, Werner: Beitrag zu den Gehirnveränderungen bei Leukämie (besonders über die Frage der Genese der Blutungen), Frankfurt. Ztschr. f. Path. **46**: 257, 1933.

There is some indication in most clinical histories obtained from patients with acute leukemia that the disease had been in progress long before the onset of the infection that led to the diagnosis. Manifestations of illness such as fatigue, pallor, lassitude, anorexia (in children), epigastric discomfort, dependent edema, purpura and similar symptoms are often present but are not mentioned by the patient until he has been carefully questioned.

Twenty-four patients with acute or subacute leukemia (seven lymphoid and seventeen myeloid) were studied for the relationship between the apparent onset of symptoms as judged by the patient and the probable beginning of the disease as determined by a careful history. In six of the twenty-four cases an adequate history could not be elicited. The results of the study in the other eighteen cases are given in table 1.

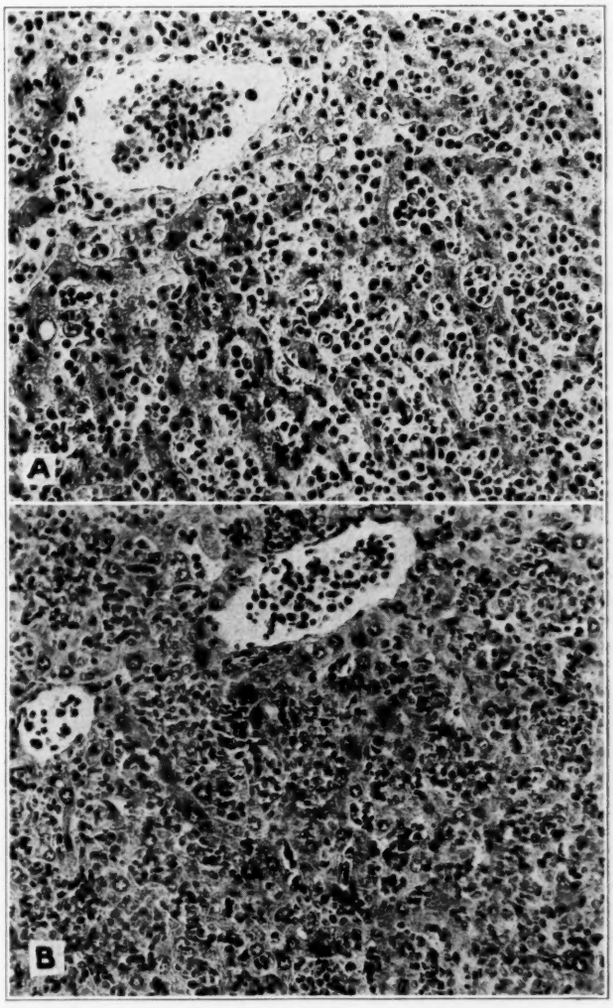


Fig. 3.—*A*, diffuse infiltration of the liver in myeloid leukemia of man; *B*, same in the mouse.

Table 1 shows that symptoms of illness are present in most cases of acute leukemia before the onset of the infection from which the beginning of the disease is often dated. It is evident from experimental studies that, at the very beginning, leukemia is not associated with symptoms of illness.

Fever frequently occurs in leukemia, but it is also found in many conditions other than infections; e. g., in the anemias. Moreover, it occurs in both acute and chronic leukemia (table 2).

Infection of the upper respiratory tract is often found in acute leukemia but it also occurs in chronic leukemia (table 3).

These data indicate that leukemia is often terminated by an infection, but there is no evidence that it is caused by it. Evidently an individual whose normal blood forming tissues are replaced by pathologic blood

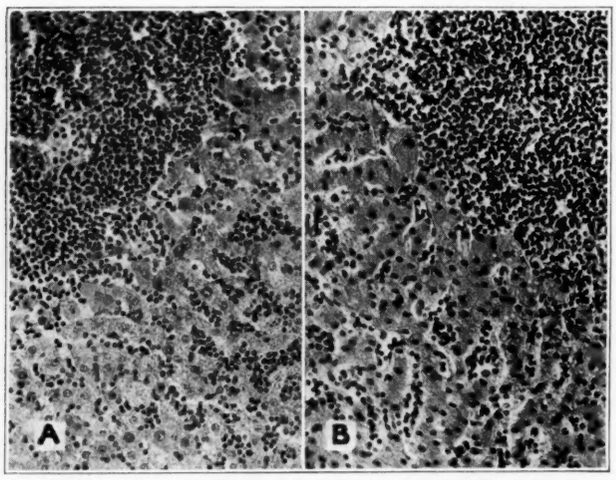


Fig. 4.—*A*, portal infiltration of the liver in lymphoid leukemia of the mouse; *B*, same in man.

cells cannot combat an infection as readily as a normal individual.

From clinical and pathologic studies of fourteen cases of acute leukemia of children, Gittins [12] recently arrived at conclusions similar to ours. Concerning the differentiation of changes in the bone marrow in leukemia and in infection, the reader is referred to his article.

TUMOR FORMATION BY IMMATURE BLOOD CELLS (LYMPHOSARCOMA, MYELOMA)

Morphologic studies in man and experimental studies in mice indicate that lymphosarcoma and lymphoid leukemia are related diseases.

In experimental lymphoid leukemia of mice the malignant blood cells of some strains, when introduced in the subcutaneous tissue, form huge tumors invading adjacent structures by continuity but do not invade the blood stream. Malignant lymphocytes of other strains, on the contrary, form slight or no tumors in the injected subcutaneous tissue but readily invade the blood, producing the blood picture of leukemia.

Similar differences were found between two strains of transmissible myelosis studied. These properties of the various transmissible strains of lymphomatosis and myelosis are retained through numerous successive animal passages and are not permanently modified by the host; hence they are due to inheritable (genetic) differences among the malignant blood cells of the different strains. These properties can be demonstrated also by intravenous inoculation by means of which malignant lymphocytes of some strains produce lymphoid leukemia, others a similar disease with slight or no blood involvement.

Generally speaking, malignant blood cells that have the ability to produce leukemia with high blood counts form small or no tumors in the injected subcutaneous tissue, whereas malignant blood cells that produce the aleukemic disease usually form large tumors. Tumors may also develop after intravenous inoculation, notably with lymphocytes that have little or no ability to invade the blood.

In a very recent study on the histogenesis of lymphosarcoma, Ehrlich and Gerber,[13] discussing the applicability of our studies in the mouse to the human disease, state that "the manner in which a 'virus' reaches a lymph node does not explain why, once involved, the process is invasive and destructive in one case (lymphosarcomatosis) and hyperplastic in the other (lymphadenosis)." On the contrary, in our paper [2] cited by these workers we have demonstrated (*a*) that mouse leukemia is not caused by a virus and (*b*) that it is a neoplastic and not a hyperplastic disease; (*c*) the type of disease is determined by several factors. The character of the malignant lymphocytes and the route of entry are sufficient to explain most if not all the differences between lymphosarcoma and lymphoid leukemia.

Another factor that determines whether a mouse will develop the systemic disease or tumors following intravenous inoculation was revealed in the study of transmissible myeloid leukemia of strain Ar 117. The immature malignant myeloid cells of this strain produce slowly growing single or multiple myeloid tumors (myeloma) in resistant mice, and myeloid leukemia with no tumors in mice whose susceptibility is decreased by irradiation with x-rays shortly before inoculation.

The differences found in the results of intravenous and subcutaneous inoculations indicate that the type of spontaneous disease is also influenced by the site of origin of the malignant blood cells and the possibility of their free entrance into the circulation.

The observations made in the study of the human disease are in harmony with the experimental studies in mouse leukemia. The lymphosarcoma cells have the ability to invade adjacent structures; but blood invasion in human lymphosarcoma occurs, as has been recognized by Ghon and Roman.[14] The study of our human material suggests that blood invasion is far more

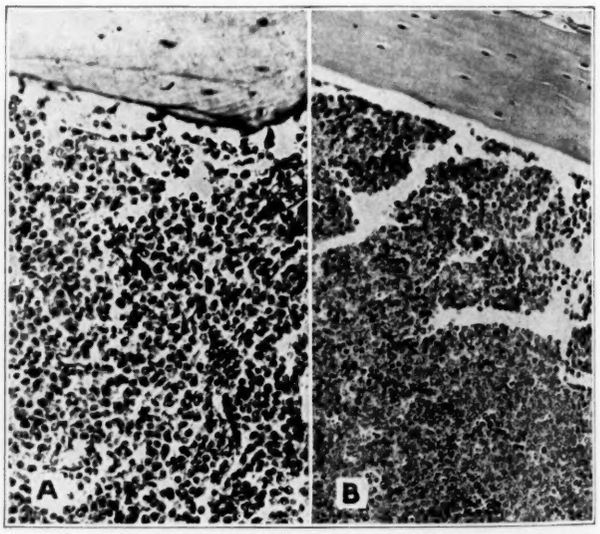


Fig. 5.—*A*, leukemic (neoplastic) hyperplasia of the bone marrow in lymphoid leukemia of man; *B*, same in the mouse.

common than is generally supposed. Invasion of the circulation by lymphosarcoma cells is suggested by microscopic changes such as infiltration in the portal tissue throughout the liver, diffuse infiltration of the spleen, and leukostasis (fig. 8 *A*).

12. Gittins, R.: Leukemia (Leukosis) in Children, Arch. Dis. Childhood **8**: 291 (Oct.) 1933.

13. Ehrlich, J. C., and Gerber, I. E.: The Histogenesis of Lymphosarcomatosis, Am. J. Cancer **24**: 1 (May) 1935.

14. Ghon, A., and Roman, B.: Ueber das Lymphosarkom, Frankfurt. Ztschr. f. Path. **19**: 1, 1916.

Locally invasive growth, a feature of myeloma or lymphosarcoma, was conspicuous in six and very slight in seven of fifteen cases of human myeloid leukemia. It was conspicuous in four and very slight in four of ten cases of lymphoid leukemia. There was evidence of hematogenous spread in four of ten cases of lymphosarcoma. However, the small number of sections

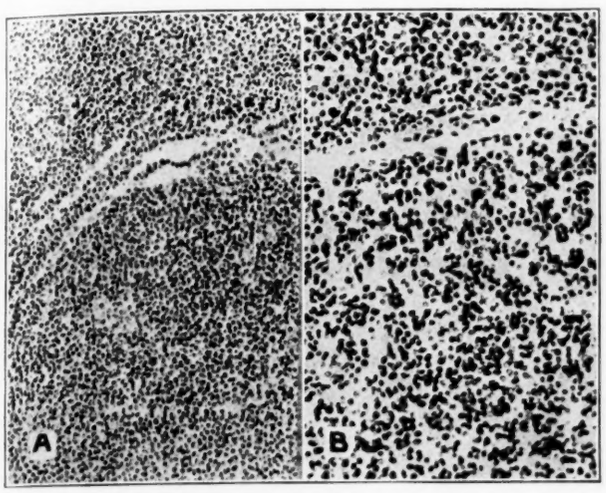


Fig. 6.—*A*, lymph node with epicapsular infiltrations in lymphoid leukemia of the mouse; *B*, same in man.

available for microscopic study allows no conclusion regarding the frequency of these changes.

Two cases of so-called reticulum-cell sarcoma have not been included in this study. Their relation to the leukemias is obscure, as is their histogenesis.

The problem of myeloma has recently been reviewed in an editorial in THE JOURNAL.[15] Our series includes three cases typical of the so-called plasma-cell myeloma. In one, the tumors were localized to the bones; in the other two they were associated with infiltration or tumors of internal organs as seen in lymphomatosis. Morphologically, the cells composing these tumors resemble as closely erythroblasts as the plasma cells of Marshalkó.

Myeloid tumors composed of myelocytes and myeloblasts, some terminating in myeloid leukemia, are well known in the literature.[16] One of the two transmissible strains of myeloid leukemia studied by us produces single or multiple myeloid tumors about the bones, the other does not; but both produce myeloid tumors in the injected subcutaneous tissue.

OBSERVATIONS ON THE PATHOGENESIS

Experimental studies indicate that leukemia results when normal white blood cells assume the characteristics of malignant cells. The various manifestations of this disease may be explained by the characteristics of the malignant blood cells, the site of their origin, the possibility of their free entrance into the circulation and the resistance of the host.

Malignant blood cells entering the circulation are at first retained in numerous organs (e. g., bone marrow, spleen, lymph nodes) and multiply at sites favorable for their growth. Hence the gradual enlargement of lymph nodes in most cases of lymphoid leukemia and the infiltration of the bone marrow. This is the first stage of the disease and may be unnoticed. It is followed by invasion of the blood with immature cells in great quantities. These cells may be retained in the capillary bed of numerous organs (leukostasis), for example, liver and kidney, seldom in the skin, or they may form extravascular infiltrations.

Leukostasis is a common and characteristic finding in leukemia and comparatively little attention is given it. It occurs not only in cases with high leukocyte counts but also in the so-called leukopenic variety (fig. 8 *B*) of the disease and may be occasionally found in lymphosarcoma (fig. 8 *A*). We know of no disease in which a selective retention of large numbers of very immature blood cells occurs in the capillary bed, other than leukemia, either of mouse or of man.

Leukostasis is usually conspicuous about sites of hemorrhage. The massing of immature leukocytes in blood vessels is sufficient to explain hemorrhage, which often occurs in the presence of a normal thrombocyte count and clotting time.[11] Figure 8 *B* shows leukostasis in a child with lymphoid leukemia, whose leukocyte count at the time of death was 1,000, as the result of massive irradiation with x-rays.

There are several recent publications stating that leukemic blood cells are formed from endothelial or reticular cells of organs such as the liver and the spleen.[17] Jaffé[18] states that even resting fibrocytes may display blood-forming potentialities and that the leukemic process is characterized by the hematopoietic activity of the entire mesenchyme.

In leukemia there is frequently extensive proliferation of histiocytes in lymph nodes, spleen and liver. The possible relation of reticulum cells to lymphosarcoma is suggested in some cases of lymphosarcoma, but in none of the cases of human leukemia studied by us is there any evidence of blood formation by histiocytes or by endothelial or reticular cells.

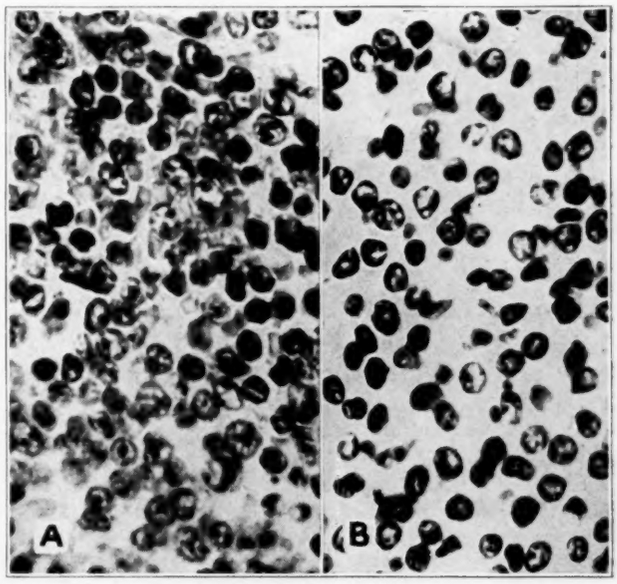


Fig. 7.—*A*, lymphocytes producing leukemic infiltrations in the mouse, shown at higher magnification; *B*, same in man.

Studies on the nature of the histiocytes (Kupffer cells) of the liver have recently been made by Dunning in association with one of us.[19] In sections of liver stained by Hortega's

15. The Problem of Myeloma, editorial, J. A. M. A. **104:** 1420 (April 20) 1935.

16. MacCallum, W. G.: Textbook of Pathology, ed. 5, Philadelphia, W. B. Saunders Company, 1932. Dubois, F. S.: Myeloblastic Sarcoma of the Scapula Associated with Chronic Splenomyelogenous Leukemia, Am. J. Path. **9:** 113 (Jan.) 1933. Baldridge, C. W., and Fowler, W. M.: Aleukemic Myelosis, Arch. Int. Med. **52:** 852 (Dec.) 1933.

17. Stasney, J., and Downey, Hal: Subacute Lymphatic Leukemia: Histogenic Study of a Case with Three Biopsies, Am. J. Path. **2:** 113 (Jan.) 1935. Potter, E. L.: Hodgkin's Disease, with Special Reference to Its Differentiation from Other Diseases of Lymph Nodes, Arch. Path. **19:** 139 (Feb.) 1935.

18. Jaffé, R. H.: Histological Studies on the Spleen in Cases of Leukemia, Arch. Path. **19:** 647 (May) 1935.

19. Dunning, H. S., and Furth, Jacob, report in preparation.

silver carbonate method for microglia the histiocytes exist as independent elements scattered diffusely throughout the organ. They lie in and about the sinusoids, between the liver cells, which entirely surround them, and in the perivascular connective tissue. In cultures of liver of chicken and guinea-pig embryos, the histiocytes maintain their individuality and their independence from other cells and exhibit no erythropoietic or leukopoietic ability.

Morphologic studies are difficult of interpretation and often do not permit definite conclusions. In the controversy as to whether in leukemia the infiltrations of the various organs are the result of metaplasia or colonization (metastasis), strong support is given the latter view by experimental studies. The immature blood cells in the circulation and organs of inoculated mice have the characteristics of those introduced. It is very improbable that the host would produce cells with precisely the same individual characteristics. This is especially unlikely in experiments in which the mice have been so heavily irradiated preceding the inoculation that their ability to produce normal blood cells is almost lost. Yet the course of the disease in these animals is

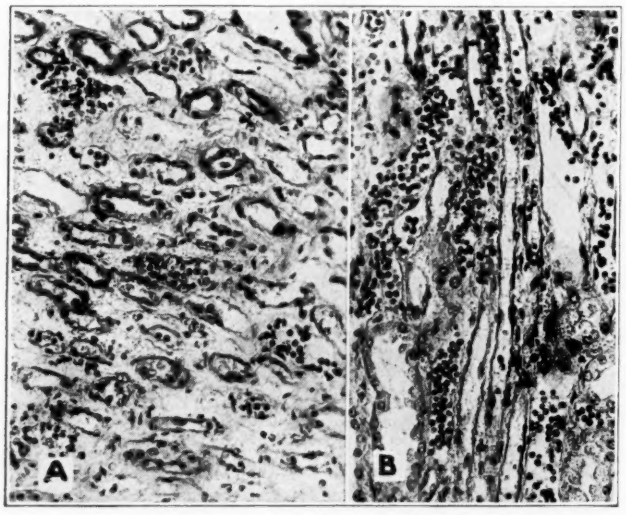


Fig. 8.—*A*, leukostasis in the kidney in lymphosarcoma of man; *B*, leukostasis in lymphatic leukemia of man after x-rays reduced the number of circulating leukocytes to 1,000 per cubic millimeter.

the same as in mice not irradiated, and similar to that of the mouse with the spontaneous disease from which the malignant cells are derived.

Naegeli [20] called attention to a fundamental difference between the blood picture in simple hyperplasia of the bone marrow and in leukemia. In the former there are continuous transitional forms between the mature and the immature granular leukocytes, a "shift to the left" in Arneth's terminology. In leukemia there is a proliferation of primitive blood cells with diminished or with no maturation to polymorphonuclear leukocytes; often there is a hiatus between the mature and the immature forms, called by Naegeli "leukemic hiatus." Microscopic studies of organs more readily demonstrate this hiatus than do blood smears. The inflammatory cells of the exudate in the alveoli of the lung occurring in pneumonia associated with several of our cases of leukemia were polymorphonuclear leukocytes; the leukemic cells that accumulated in the capillaries (leukostasis) were immature myeloid cells without transitional forms between the two. In the blood and blood forming organs many types of white blood cells may be present, but the leukemic infiltrations outside these organs are composed almost invariably of the malignant cells only.

20. Naegeli, Otto: Blutkrankheiten und Blutdiagnostik, ed. 5, Berlin, Julius Springer, 1931.

CONCLUSIONS

Leukemia of man is essentially the same disease as leukemia of mice. Both the acute and the chronic forms, lymphoid as well as myeloid, are neoplastic diseases. The immature blood cells in leukemia are malignant cells, which may form tumors or diffuse infiltrations and possess characteristics of their own. Studies of leukemia of the mouse indicate that leukemia, like cancer, is of multiple etiology; its development and manifestations are dependent on intrinsic (genetic) and extrinsic factors. An analysis of these factors in the mouse and their rôle in the human disease requires further study.

1300 York Avenue.

ABSTRACT OF DISCUSSION

ON PAPERS OF DR. CHAMBERLAIN, DR. CRAVER AND DRS. FURTH, FERRIS AND REZNIKOFF

DR. G. E. RICHARDS, Toronto: For twenty years, those who have been engaged in roentgen and radium therapy have been wrestling with the problem of dosage and have gone through the periods when dosage was looked on as purely a physical matter. Dr. Chamberlain has made it clear that, in the presence of the perfected apparatus, dosage is a biologic matter. The correct dose is the dose that best suits the needs of the individual patient at a given time and presupposes the use of standardized preparation. No dose of x-rays can be a predetermined, mathematical, calculated dose. It must be a dose administered and controlled by the observed tissue reactions in the individual. These observed tissue reactions are of as much importance to radiologic physicians as blood sugar estimations are to the physicians engaged in the treatment of diabetes. The unknown will always be the individual response and this must be controlled regardless of any dose, no matter what it may appear to be on paper. The problem of dosage is as nearly solved as many of the problems of drug therapy. There is available a highly efficient form of therapy, almost an instrument of precision, and the application of this instrument to the problems of disease, particularly the problem of cancer, remains an individual one that can never be reduced to a standard formula. Dr. Chamberlain has spoken of the possibilities along the line of super high voltage therapy. It has always seemed to me that the answer to this question was provided by experience with large units of radium from 4 to 8 Gm., as these represent a wavelength of the order of one million volts or one and one-half million volts, and the answer to that question can be obtained from the study of this particular work quite as well as and probably more quickly and accurately than from x-ray machines or x-ray tubes operating at a million volts.

DR. T. R. WAUGH, Montreal: From the standpoint of the hematologist, the experimental production of leukemia in animals offers a most important method of approach to the problems associated with these conditions. On the other hand, from the standpoint of the pathologist I think that one should be a little hesitant about accepting, as established, the neoplastic nature of these conditions. It is hardly justifiable to define the leukemic process as identical with neoplastic growth, when as a matter of fact the absolute criteria of tumor growth are as yet by no means certain. In the second place there is undoubtedly in the various forms of leukemia in man a wide range, which approaches the hyperplasias on the one hand, hence called hyperplastoid, and the tumors on the other, hence referred to as sarcoid. This fact has led to the introduction in the scale of proliferative activities between hyperplasia and neoplasia, and merging into them on either side, of a third type, designated as cataplasia, and the leukemias fall into this division. Cataplasias have neither the complete differentiation of cells and preservation of functional activity, which charac-

terizes the hyperplasias, nor the independent atypical manner of growth of the neoplasias. Nor is the introduction of this intermediate type merely a name, for it represents a biologic principle and law of growth. One finds the same stages in development of malignant tumors as in cancer of the breast, in which one can trace the transition of proliferative activity of epithelial cells from a simple hyperplasia through a stage of abnormal development and immaturity to true neoplasms. As regards cancer, Dr. Craver has pointed out the need of an investigation of the predisposing factors as encountered in the patient, and this is undoubtedly an important field, particularly open to the clinician. For the research workers there appear to be three main methods of approach. There are first those who study the cancer cells themselves and see in them specific attributes; they might be called specificists. Secondly there are those who investigate the stimulating and irritating factors; they might be termed etiologists. Finally there are the comparatively few who look to the changes within the host which allow the malignant growth to take place; they see in the environment of the proliferating cells the real secret of their emancipation and might be termed environmentalists. Cancer might be likened to a runaway horse. Witnessing such an event, some would be interested in the horse itself, others would wonder what frightened the horse, while a few would be concerned with why the horse got away and could not be controlled. Horses frequently get frightened but seldom run away. I am inclined to believe that too much attention has been paid to the various stimulating agents and the cancer cells themselves, to the neglect of that other, most important factor, the host.

DR. L. K. DIAMOND, Boston: The difficulties of determining the etiology of cancer in general and leukemia in particular become greater when the disease occurs in the infant and child rather than in the adult. Leukemia is so much more likely to be an acute fulminating process in the young, with symptoms and signs frequently similar to those produced by an infectious process, that even after years of study the evidence for the neoplastic nature of the disturbance has been scant. Too often leukemia in childhood is associated with hyperpyrexia, pain in various organs, the presence of extremely immature, difficult-to-recognize leukocytes and a rapid, fatal course. Infection in this age group often is followed by the same group of symptoms. Therefore the best lead to the understanding of the cause of leukemia in such cases is the comparison of the experimental leukemia in animals with that in human beings. Two years ago I started studying the course of leukemia experimentally produced in mice and was impressed by its similarity to that in infants and children. In fact, examination of tissues from each, side by side, showed the impossibility of differentiating the two in many cases. An interesting observation was the fact that a malignant cell can be so specific when injected into a susceptible host by a single route as to produce the same group of symptoms and signs, a similar course and identical changes in the various organs involved in every mouse. In a review of seventy-five cases in infancy and childhood seen during the last eight years, it became readily apparent that the leukemias could be divided in a fashion different from that used previously. In fact, many similar case histories occurred in which the onset of symptoms, the development of signs, the course of the disease, the character of the malignant cell and its level in the blood, the type of termination and the changes in the organs at necropsy were similar in many respects. This was used as a basis for classification. In forty-five cases certain definite groups could be separated. One easily recognized type invariably started with pain in a single joint followed by hyperesthesia, pains in several joints or bones, limitation of motion, irritability, weakness and fever. Rheumatic fever was most commonly suspected. However, the development of pallor, petechiae, enlarged liver and spleen and numerous immature forms of leukocytes, even though their level in the blood was not high, followed by a rapid terminal anemia and death within a few months with necropsy evidence of leukemia, was invariably associated with a small, malignant lymphocytic cell. Another group showed early hemorrhagic tendencies. Still another group showed gradual development of pallor, weakness, abdominal pain, generalized glandular adenopathy, extreme hyperpyrexia and a rapid termination in a few weeks, associated with a single type of malignant lymphoid cell. It has been possible to recognize four other types of malignant cells, each of which is associated with a definite and characteristic progression of symptoms, signs, termination and infiltration of organs.

DR. CHARLES C. LUND, Boston: Dr. Chamberlain mentioned biopsy. Many people are still afraid of biopsy. They are afraid that the cancer will be spread by the procedure. I believe that a biopsy done properly on a reasonably accessible tumor is almost universally indicated and that it is perfectly harmless if followed, within a few days or preferably a few hours, by adequate roentgen, radium or surgical treatment. Dr. Craver listed many of the known factors in the etiology of cancer. I am going to show how some of these factors may work on one another. There will be cases in which, of course, a single factor is important, and that is the only important one. An example might be x-ray cancer. A sufficient dose of x-rays will certainly produce cancer in every subject. The only difference that the changes in the host will make in that situation will be the rapidity with which the cancer will develop. On the other hand, certain people are born with conditions that are sure to terminate in cancer if they reach an advanced age. One of the worst offenders in that line is multiple polyposis of the intestine. There are others. Inheritance and irritation are both important in skin cancer, and by that I mean ordinary common basal cell as well as epidermoid skin cancers. For instance, the person with red hair and very light skin is much more irritated by sunburn or other exposure than the Mediterranean type of person, or he, in turn, than the Negro. With the same exposure to the elements, the incidence of skin cancer in the redheaded individual with light skin is probably ten times what it is in the Italian, Greek and Spaniard. Again, their incidence is probably ten times that of the Negro. The type of skin is what is inherited. The irritation, added to susceptibility, is what produces cancer at a given time in a given case.

DR. W. EDWARD CHAMBERLAIN, Philadelphia: I thank Dr. Lund for giving his opinion on biopsy. It is a number of years since I thought of the time when physicians were a little afraid of biopsy. It is now being done universally, and many statistics have been accumulated or much experience has been gained to indicate that it is a perfectly safe procedure when properly carried out.

DR. JACOB FURTH, New York: From the theoretical standpoint, any type of cell that has the ability to multiply may undergo unrestricted multiplication and produce a neoplasm. Blood cells should be no exception. When cells of a breast gland undergo unrestricted multiplication, one expects to find a growth in the breast. What change is expected when cells that exist as detached individuals and that readily find their way into the blood stream and grow particularly well in certain organs, e. g., bone marrow, spleen and lymph nodes, undergo unrestricted multiplication? One would expect to observe precisely the manifestations of disease that are found in leukemia. Immature cells of the bone marrow injected into normal animals disappear from the blood and the animals remain healthy. When a few immature blood cells, less than ten, from an animal with leukemia are injected into a normal animal, the cells introduced multiply unrestrictedly, with no apparent purpose, until the host dies. Studies of human leukemia led to no definite conclusion concerning the nature of this disease, but studies in animals yielded conclusive results. Those who have availed themselves of the opportunity to study leukemia of mice have come to conclusions similar to those presented by us. We hope that Dr. Waugh may also avail himself of this material and reach the conclusion that the human disease is neoplastic and its manifestations are similar to those of the animal disease.

Inspection and Palpation.—The examination of the cardiac area by inspection and palpation is too often neglected. The accurate diagnosis of cardiac conditions by the average practitioner can be accomplished far more easily and accurately by the use of inspection and palpation than by auscultation.—Dr. E. J. G. Beardsley, quoted by Fisher, Alexander: Aphorisms in Clinical Medicine, *Canad. J. Med. & Surg.* **77**:166 (June) 1935.

LOBAR COLLAPSE IN CHILDREN

GLADYS L. BOYD, M.D., F.R.C.P. (C.)
TORONTO

The collapse of one lobe of the lung may take place in various locations and from several causes. Its actual occurrence is so restricted to the atelectasis of a lower lobe, characterized radiologically, by a basilar triangular shadow, that its discussion is practically limited to the study of the latter condition. Since Dieulafoy [1] first described these shadows in 1910 there has been no dearth of literature on the subject. My only excuse for adding to its volume is the clinical and pathologic material that I have to present, which may add to the elucidation of a still unsettled problem.

Before proceeding with the discussion of basilar triangular shadows, I would like to mention the rarer cases in which lobar collapse of an upper lobe occurs. Years ago, Heller [2] described a series of cases of bronchiectasis in children from 9 months to 7½ years of age. The lesions involved whole lobes, usually upper ones, and were characterized by collapsed lobes with pus-containing cavities separated by narrow septums and containing little lung tissue. He considered them to be congenital in origin. I have noted that acute bronchiectasis in infancy much more frequently involves these lobes than would be expected from the prevalence of lower lobe infections in older children and in adults. During the life of an infant who died at 6 months of age with a history of infections of the respiratory tract for three months, a roentgenogram was considered a picture of chronic bronchopneumonia. Consideration of the roentgenogram showed several important differences from the usual picture of pneumonic consolidation. It was homogeneous. The lower border was sharply defined, and perhaps, most important, the mediastinum was shifted to the diseased side. Postmortem examination revealed an atelectatic bronchiectatic right upper lobe. There was no pigment present, but this was insufficient evidence to warrant the conclusion that the lesion was congenital.

A basilar triangular shadow may be described as a homogeneous opaque shadow in the form of a right angled triangle having for its base the diaphragm, one side the mediastinum, and a hypotenuse formed by a line extending from the hilus to some point on the diaphragm. The latter may be straight, convex, concave or slightly irregular in its outline. Importance is attached to its character as varying with the underlying cause. These opaque areas until quite recently have been attributed to mediastinal pleurisy, seldom proved, and to fibrosis of the lung. Savy [3] and Wallgren [4] have both demonstrated purulent effusion. The hypotenuse in these cases is convex. Armand-Delille, Lévy and Marie [5] in 1925, and shortly afterward Singer and Graham,[6] were the first to associate this picture with pulmonary collapse. The former observers noted its association with saccular bronchiectasis, while the latter described its occurrence in a radiologic study of bronchiectasis and noted the collapsed condition of such lobes when removed surgically. Rist and his co-workers [7] recognized its association with bronchiectasis but did not appreciate its pathologic significance.

Granting that this shadow occurs most often in bronchiectasis and by some is regarded as pathognomonic, it is well to point out its possible occurrence in other diseases. Mention has already been made of authentic cases due to pleural effusion. Anspach [8]

Bronchiectasis Associated with Lobar Collapse Shadow

Case	Age of Onset	Cause	Age When Treatment Was Started	Shadow First Noted	Health	Sputum	Clubbing	Location of Disease	Bacteriology (Aspirated from Lung)	Bronchograph	Naso-pharyngeal Infection	Result
1. W. J. ♂	5 yrs.	Pneumonia at 5 and 7, tonsillectomy and adenoidectomy at 8	10	6	Poor (carditis)	+++ Foul	+	Bilateral	Pneumococcus	Cylindrical	Tonsils and sinuses	Chronic
2. M. S. ♀	4 mo.	Penumonia at 4 mo., ill 4 mo.	8½	8½	Fair	++ No odor	+	Left	Hemolytic streptococcus influenza bacillus	Saccular dilatations	Pansinusitis	Improved
3. H. R. ♂	Infancy	Pneumonia 3 times in infancy	10	10	Fair	+ No odor	0	Right	Hemolytic streptococcus	Saccular dilatations	Pansinusitis	Chronic
4. E. H. ♀	3 mo.	Pertussis at 3 mo.	10	10	Poor	+++ Foul	++	Right	?	?	Tonsils, pansinusitis	?
5. H. N. ♀	Infancy	Pneumonia in infancy	10	10	Poor	+ No odor	+	Right	?	Cylindrical	Sinuses	Chest clear at 20
6. N. E. ♂	2 yrs.	Indefinite	3	3	Poor	+ No odor	+	Left	Pneumococcus type III	Cylindrical	Tonsils and sinuses	Chronic bronchiectasis
7. E. V. ♂	1½ yrs.	Indefinite	2½	2½	Poor	Very little	+++	Left	Hemolytic streptococcus	Saccular	++++ Tonsils and all sinuses	Died from accident
8. W. H. ♂	9 yrs.	Pneumonia	11	11	Poor	++++ Foul	++	.....	Hemolytic streptococcus	Saccular	Tonsils and sinuses	Died following lobectomy
9. M. B. ♀	8 yrs.	Pneumonia at 8 yrs.	9½	9½	Poor	++++ Foul	+++	Bilateral	Streptococcus viridans	Cylindrical	Pansinusitis	Died following lobectomy
10. B. L. ♀	6 yrs.	Indefinite at 6 yrs.	10	10	Poor	+++ Slight, foul	+++	Left	Streptococcus viridans	Cylindrical, later saccular	Tonsils, maxillary sinusitis	Doing well
11. C. V. ♂	7 yrs.	Peanut aspiration	7	7	Fair	None	++	Right side	Hemolytic streptococcus	Saccular	Tonsils	Doing well
12. M. G.	2 mo.	Nasopharyngeal bronchitis	6 mo.	6 mo.	Poor	None	Slight	Right	?	Saccular	Diseased adenoids	Died

Read before the Section on Pediatrics at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 12, 1935.

From the wards and laboratories of the Hospital for Sick Children and the Department of Paediatrics, University of Toronto, under the direction of Alan Brown, M.D., F.R.C.P. (C.).

1. Dieulafoy, Georges: Bronchiectasis, in Manuel de pathologie interne, Paris, Masson et Cie, 1910.

2. Heller, A.: Die Schicksale atelektatischer Lungenschnitte, Deutsches Arch. f. klin. Med. **36**: 189, 1885.

3. Savy, M. P.: Progrès méd. **27**: 371, 1910.

4. Wallgren, Axel: Beitr. z. Klin. d. Tuberk. **69**: 641, 1928.

5. Armand-Delille, P. F.; Lévy, R., and Marie, J.: Revue franç. de pédiat. **1**: 125, 1925.

6. Singer, J. J., and Graham, E. A.: Am. J. Roentgenol. **15**: 54 (Jan.) 1926.

7. Rist, E.; Jacob, P., and Trocone: Ann. de méd. **21**: 144, 1927.

8. Anspach, W. E.: Atelectasis and Bronchiectasis in Children, Am. J. Dis. Child. **47**: 1011 (May) 1934.

reports a case of congenital heart disease showing this picture. Recently one similar case in a young infant was seen in this clinic. In one other child with rheumatic carditis there was a triangular basilar shadow on the right side which on cursory examination presented the picture of pericardial effusion, but closer study showed its true nature. Iodized poppy-seed oil was injected in this case but revealed no bronchiectasis.

Space will not permit either the display of the roentgenograms of all my cases or their case histories. The accompanying table summarizes the essential points and such roentgenograms are shown as will demonstrate the essential points. Physical signs are not given in the table because there is no constancy in those found, except the cardiac displacement to the diseased side. Sometimes they are such as to suggest the presence of lobar collapse without the aid of a roentgenogram, but they vary considerably. There is usually dulness, more or less marked, altered breath sounds and some moisture, but such signs are not sufficiently characteristic to differentiate these from other lesions of the lower lobe.

Pathologic specimens were obtained from four patients either by surgical removal or at autopsy. In all, the lobe was greatly shrunken. The upper lobes were enlarged to fill up the space ordinarily occupied by the diseased lobe. In three of the four the collapsed lobe was the only pathologic basis for the triangular shadow; in the fourth case a shadow might have been produced by the fibrous adhesions that extended from the hilus to the base. The pleural adhesions were not marked and could be separated without tearing the lung tissue. The cut surfaces showed numerous dilated bronchi ending in saccular or cylindric dilatations. These were separated by narrow strips of tissue. The bronchial mucosa was thrown into transverse ridges. The parenchyma was much reduced in amount, collapsed and nearly airless. There was some fibrosis in all cases.

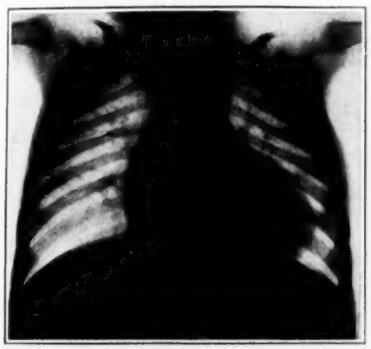


Fig. 1 (case 7).—E. V. had bronchiectasis from 1½ years of age. Death occurred at 3½ years as a result of an accident.

Microscopically, almost no normal lung tissue was to be seen. The few remaining alveoli were collapsed and thick walled. There was some pigment in every patient except the baby, who was too young to be expected to have any. The bronchi were widely dilated and lined with stratified columnar epithelium. In some areas the lining was replaced by granulation tissue. There were a few islands of cartilage remaining. Some of the bronchi had cilia and a few had hypertrophied mucous glands. The stroma was invaded by lymphocytes, eosinophils and polymorphonuclear cells.

Basilar triangular shadows have been noted in roentgenograms of the lungs in fourteen children at the Hospital for Sick Children. Twelve of these were definitely associated with bronchiectasis. This represents a morbidity of only about 7 per cent of the cases of bronchiectasis studied in the period of observation. In all cases, as far as could be determined, such shadows were produced by collapsed lower lobes of the lung. There was no evidence in our cases and little in the literature to support Kerley's [9] contention that such collapse usually occurs in an accessory lobe of the lung.

The shadows seen in our cases were permanent with one exception (case 5). No cases have come under observation such as those described by Findlay [10] in which reinflation could be produced by deep breathing, induced in his cases by inhalation of carbon dioxide. He states that this reexpansibility is the only proof of the atelectatic nature of the lobe. He explains, however, that in long standing cases reinflation may be prevented by fibrotic changes. Bronchiectatic dilatation may be produced within two weeks of onset, as in case 11, so that reinflation would have to be done very early to be effective.

Fig. 2 (case 7).—Appearance after injection of iodized oil.

The earlier observers of triangular basilar shadows, while still considering those produced by mediastinal pleurisy, commented on the larger amounts of sputum in these patients. There has been a tendency in more recent literature to stress the mildness of the bronchiectasis associated with lobar collapse, certain observers [11] calling it "dry bronchiectasis." A glance at the table will show that, while very early cases may not be attended by serious ill health, the disease is progressive, and ultimately all our patients had sputum. This became foul and abundant only when secondary invasion of other lobes was present. The general health was seriously impaired in all, either periodically or continuously.

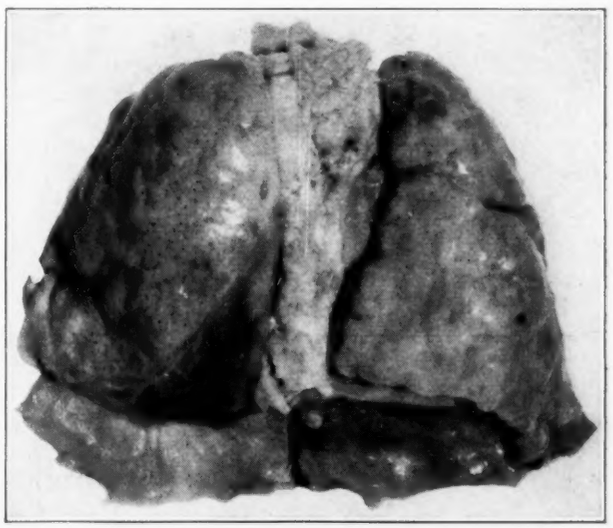


Fig. 3 (case 7).—Lung obtained post mortem, showing the collapsed lower lobe.

The pathologic picture, aside from the very shrunken lobe, varied little from that already described by Erb [12]

9. Kerley, P.: Brit. J. Radiol. **5**: 234-240 (March) 1932.
10. Findlay, L.: Arch. Dis. Childhood **10**: 61 (April) 1935.
11. Wall, C., and Hoyle, J. C.: Brit. M. J. **1**: 597 (April 8) 1933.
12. Erb, I. H.: Pathology of Bronchiectasis, Arch. Path. **15**: 357 (March) 1933.

as found in bronchiectasis in children, the essential difference being in the relatively greater amount of collapse in these cases and the greater degree of fibrosis in the others.

There is no difference in the etiology. Pneumonia is the commonest precursor in all types. The bacteriology, as in bronchiectasis, generally is not specific.

Fig. 4 (case 9).—Roentgen appearance, Oct. 27, 1932, at 9½ years of age. M. B. was never well following pneumonia at 8 years of age. Bronchiectasis was diagnosed at 9 years, and the patient died following lobectomy at 10 years of age.

COMMENT

Why does lobar collapse occur in some cases of bronchiectasis? Warner and Graham [13] were able to produce such shadows in the lungs of dogs by occluding the bronchus to a lower lobe. It appears strange that if this were the important etiologic factor lobar collapse would not be a frequent result of foreign body inhalation in children. A goodly number of such cases are seen every year, and until recently none of them have ever shown a triangular shadow in the roentgenogram. This occurred in case 11 but might in this case have been due to the pneumonia that preceded its development or to the mechanical irritation produced by the peanut that had been inhaled. Pulmonary collapse is frequently seen after aspiration of a foreign body, but it is either massive in type or irregular, rarely lobar. Bronchiectasis develops very quickly with bronchial occlusion by a foreign body not removed within a few days.

Some observers consider this lobar bronchiectasis to be congenital, basing their conclusions on the absence of pigment and of alveolar tissue. The latter is certainly small in amount but never entirely absent. Pigment was present in all our patients except the infant. None with lobar collapse dated their illness from birth. There was no evidence of its congenital origin.

Every case was examined bronchoscopically, and pathologic changes of the bronchial mucosa were apparent. The essential lesion is probably in the smaller bronchioles, which become occluded by secretion with resulting collapse. Dilatation is produced readily in the weakened bronchi by increased intrabronchial pressure. Whether such dilatations are compensatory, as Findlay suggests, is not certain. It may be that these cases are more commonly associated with a lobar type of pneumonia than are those without lobar collapse.

CONCLUSIONS

Basilar triangular shadows in roentgenograms of children's chests are due to lobar collapse.

Such collapse is usually associated with bronchiectasis. It is not pathognomonic of this disease but is very suggestive.

Lobar atelectasis is the result of infection or injury of the bronchial wall, with secretion and consequent plugging of the bronchioles.

13. Warner, W. P., and Graham, Duncan: Lobar Atelectasis as a Cause of Triangular Roentgen Shadows in Bronchiectasis, Arch. Int. Med. **52**: 888 (Dec.) 1933.

ABSTRACT OF DISCUSSION

DR. JOSEPH STOKES, Philadelphia: I think every physician has been interested in this condition since it was brought so forcibly to our attention some years ago. I have been extremely interested in what Dr. Boyd has said. In the study of a group of children at Children's Hospital, Philadelphia, made chiefly by Dr. Rubin, we have been particularly interested in the fact that these children are mostly from the underprivileged classes, most of them being relief board cases, and it has seemed that this was directly associated with conditions of malnutrition and poor hygiene. In the infant, rickets might be an important factor in which there is improper development of the chest and also softening of the ribs, the inability to expand properly and therefore to overcome whatever collapse may have been present. As in congenital heart disease, these children should be transferred to a special group that can be studied thoroughly and watched closely over a period of years so that intercurrent infections may be kept at a minimum. The roentgen examination gives a great many more signs than physical examination, and I think there again it is important to remember that the x-rays should be considered a method of diagnosis as useful and as readily applicable as the stethoscope, and not left entirely to the roentgenologist. In actual clinical diagnosis, I think that very few signs are found in these cases. We have had a group of cases in the Children's Hospital which I should like to ask Dr. Boyd whether she has seen in Toronto; namely, infants with very marked dyspnea, cough, apparently what might be called capillary bronchitis and fatal bronchopneumonia. About six cases have come to necropsy. The characteristic finding has been dilated smaller bronchioles, standing out well above the lung tissue. The appearance is that of a group of small white "pipes" standing out amidst the consolidated lung tissue. Apparently there is marked inflammatory reaction in the bronchial walls. I wonder whether in Dr. Boyd's opinion this type of case may result, on recovery, in a future bronchiectasis. I should like very much to hear from Dr. Boyd about the question of treatment in these conditions.

DR. J. S. WALL, Washington, D. C.: It is interesting to know that the name of Pasteur is associated so intimately with collapse. This is William Pasteur, an Englishman, and not Louis Pasteur the Frenchman. In 1914, when he made his last contribution, he was recognized as the student who knew most about collapse. Dr. Boyd has leaned toward the theory of the plug origin, or obstructive origin, in producing collapse, and strangely enough Dr. Pasteur never acceded to the opinions of others that collapse was produced by a plug. His first studies were on collapse in diphtheritic paralysis, and even in his retirement he still is unrepentant in recognizing the plugging of a bronchus producing collapse. As I understood, in most of Dr. Boyd's cases there was a sequence of pneumonia, bronchiectasis and collapse, showing really that the dilatation of the tube and the presence in that tube of thick, viscid mucus probably had something to do with the production of collapse of the lung. Dr. Stokes said that in these cases very little could be learned from stethoscopic examination. That has often been my experience. The striking thing is the clinical picture of collapse cases in which a considerable area of lung is involved; these children look very much like children who are suffering from clinical acidosis with hyperpnea out of proportion to any somatic disturbance. Perhaps one gets a clue in that way. The second important clue is the dislocation of the heart toward the affected side, and those two circumstances taken together even may point the way to diagnosis that would

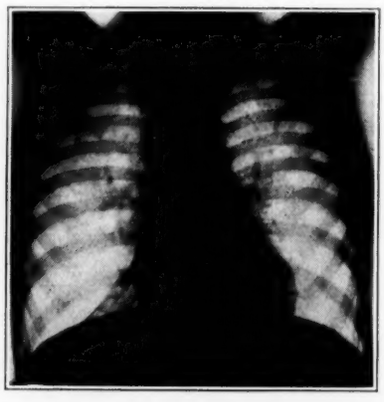


Fig. 5 (case 9).—Roentgen appearance, April 21, 1933, at 10 years of age.

later be confirmed by roentgen examination or sometimes, unfortunately, by autopsy. An interesting point in connection with collapse is the sequence of pneumonia, bronchiectasis and collapse that has been pointed out by Dr. Boyd, and whether it might not be reasonable to believe that pulmonary collapse may even antedate pneumonia. Dislocation of the heart is a striking sign of pulmonary collapse; and perhaps pulmonary collapse really does precede pneumonia, rather than being the sequel to pneumonia.

DR. WILLIAM E. ANSPACH, Chicago: It seems to me that the important thing is not to wait to recognize the process at work in these cases until bronchiectasis is in full bloom, when the patient must run the risk of lobectomy, which so often fails to cure even though the patient survives the operation. It has

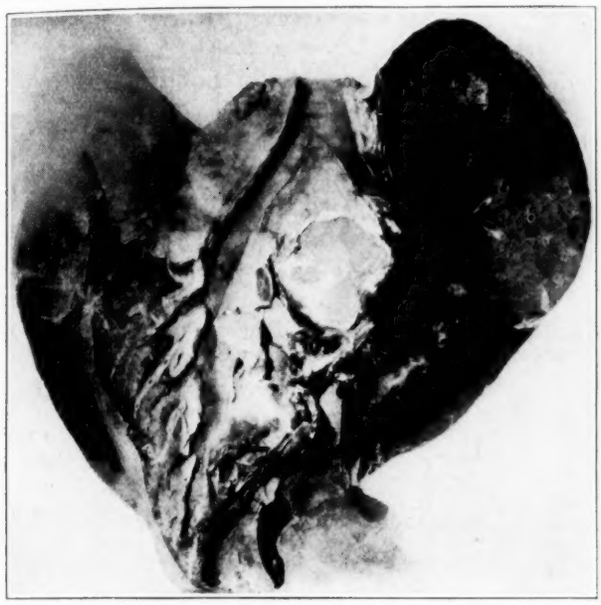


Fig. 6 (case 9).—Lung obtained post mortem. The right lower lobe previously removed by lobectomy showed a similar appearance.

been my privilege to watch a number of these cases from infancy to autopsy or beyond puberty. The triangular shadow in the roentgenogram, which must be depended on for the earliest diagnosis, is seen soon after the first symptom and as a rule is very small, smooth and homogeneous, not like the usual case of pneumonic consolidation. In the early period there is not the striped shadow or the shadow with scattered areas of decreased density so frequently seen in advanced cases of bronchiectasis. Cases coming to necropsy early after the onset of acute symptoms showed atelectasis of the lower lobe, and there were no bronchial dilatations. Patients continuing to live, who retained their dense "triangular shadow," developed bronchiectasis. Bronchiectasis develops in a high percentage of children who have inadequate bronchial drainage. The roentgenologic sign of atelectasis is a warning of the presence of bronchial obstruction. Bronchiectasis can be avoided in a large number of cases by means of early bronchial aspiration and postural drainage. At the Children's Memorial Hospital, where there has been an unusually large number of these cases, it has been interesting to note the predominance of right sided lower lobe collapse in children under 3 years of age. Additional collapse of other portions of the lung frequently followed and the mortality was high. Those who survived showed most often a left sided collapse and later left sided bronchiectasis.

DR. GLADYS L. BOYD, Toronto: I regret that I did not make my paper briefer so I could read it all. Perhaps it would have made some of the points clear that have been brought up for discussion. In reply to Dr. Stokes about the poverty of these patients, most of them were from the poorer classes. I find bronchiectasis largely a disease of these classes and I do not think that patients whose bronchiectasis was associated with basilar triangular shadows were any worse off economically than others. Rachitic chest deformities have not been observed, but only those produced by the pulmonary disease. On the question of the recurrence of bronchiolitis, dilated bronchi in infants, I frequently observed that, in cases particularly of influenzal pneumonia or associated with a good deal of bronchiolitis, the bronchi were dilated and sticking out sometimes with abscesses in the lungs as well. As far as treatment is concerned, in this group of cases it is pretty well limited to the treatment of bronchiectasis. I think, from the discussion that has gone on, that there are probably two groups of cases showing these shadows. In Dr. Anspach's cases, which are far more numerous than my own, they are of course mostly in young children and not necessarily associated with bronchiectasis, and reinflation of the lung could be produced. Specimens were obtained from four of my cases and it would be impossible from looking at these lungs to see how anything could reinflate them. As to diagnosing the shadow before the bronchiectasis occurred, in some of my cases the bronchiectasis has preceded development of the shadow. It is important to appreciate how rapidly bronchiectatic dilatation can occur in children. Ten days after the aspiration of the foreign body with no previous illness at all, well marked, grapelike dilatations have been frequently observed. In the one case in which a triangular shadow developed four days after aspiration of a foreign body the dilatations were well marked in the course of ten days. It has not been my experience that even in those cases reinflation could occur. They have been bronchiectasis from the start, and treatment has been more successful as far as clinical relief of the condition goes than it has in cases due to infection entirely, but it has not been any more effective in clearing up the dilatation.

OSTEOMYELITIS IN INFANCY

WILLIAM THOMAS GREEN, M.D.
BOSTON

Osteomyelitis in infancy differs in so many respects from osteomyelitis in older children that a separate consideration of the disease in children under 2 years of age is desirable. Until recently these distinctions have not been particularly emphasized in the medical literature. In 1932 Paschlau [1] and in 1933 Green and Shannon [2] independently described certain of these differences, a knowledge of which is essential for proper treatment. At the Children's Hospital, Boston, more cases of acute osteomyelitis are seen in infants than in children from 2 to 12 years of age.

Osteomyelitis at Two Ages

Children Under 2 Years of Age	Children Over 2 Years of Age
Streptococcic, 63 per cent Staphylococcic, 30 per cent	Staphylococcic usually
Brief duration	Long duration
Rapid healing of wound	Slow healing of sinuses
Sequestration infrequent	Sequestration usual
Recurrences rare	Recurrences frequent
Lesions heal completely	Residual sclerosis of bone

The usual conception of acute osteomyelitis is that of the syndrome as seen in older children—a disease generally due to Staphylococcus aureus (91 per cent), which after the acute phase usually adopts a chronic course of long duration, with sequestration, persistent sinuses and frequent recurrences. On the contrary, osteomyelitis of infancy is a disease more frequently due to Streptococcus haemolyticus in which, if the

From the Department of Orthopedic Surgery, Harvard Medical School, the Children's Hospital, and the Infants' Hospital.

Read before the Section on Orthopedic Surgery at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 14, 1935.

1. Paschlau, Gunther: Die Besonderheiten der Osteomyelitis im frühen Kindesalter, Monatschr. f. Kinderh. **55**: 280-306, 1932.

2. Green, W. T., and Shannon, J. G.: Paper read in March 1933 before the Boston Orthopedic Club.

child survives the acute infection, the prognosis for complete and rapid recovery is excellent.

In a previously reported statistical study of ninety-five cases seen at the Children's Hospital, from 1912 to 1932 inclusive, Green and Shannon [3] suggested that:

1. Osteomyelitis in infancy was due more frequently to Streptococcus haemolyticus than to Staphylococcus aureus (63 per cent were streptococcic, and 30 per cent were staphylococcic).

2. The mortality rate of osteomyelitis in infancy was high, 21 per cent. (This compares with 38 per cent in the series of Paschlau [1] and 53 per cent in the series of Santi.[4]) Under 6 months of age the mortality was even higher: 44 per cent as compared to 13.4 per cent in those patients between 6 months and 2 years of age.

3. Wounds healed rapidly after operation and were closed permanently in an average of three months after the operation. Frequently they healed in from four to six weeks.

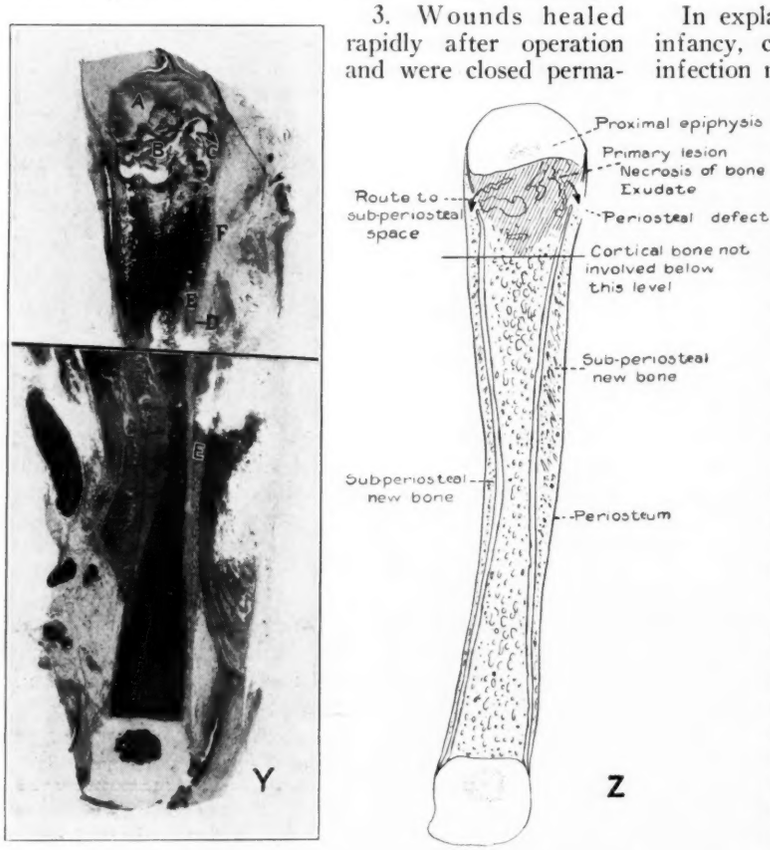


Fig. 1.—*Y*, longitudinal section of tibia. Osteomyeltis of three weeks' duration in an infant aged 5 weeks. The lesion started adjacent to the proximal epiphysis (*A*) at the metaphysis (*B*) and spread to the subperiosteal space at *C*→, where the cortical bone is minimal. Note that subperiosteal new bone (*E*) extends the length of the shaft, although involvement of the cortex does not extend beyond *F*. *B*, original lesion with necrosis of bone and exudate. *D*, periosteum. *Z*, diagrammatic sketch of *Y*, showing mechanism of "natural decompression." Note the arrows.

4. Sequestration was infrequent; gross sequestration occurred in only six of the ninety-five cases.

5. Recurrences were rare, occurring in only two of ninety-five cases and in both instances consisting of brief drainage followed by final healing.

6. Complete healing of the lesion in the bone was the rule. In many instances the site of the lesion could not be recognized in the roentgenograms taken in an end-result study. Of forty-one cases examined in this end-result study (not selected except as to service) thirty-nine were entirely healed clinically and by roentgenographic determinations; one case had been healed clinically for four years, although the roentgenogram suggested a residual lesion. The final case, a recent one, has not yet healed.

7. Deformities occurred in five of the forty-one cases examined in the end-result study. Four of these were from secondary lesions of joints and one was from epiphyseal displacement and injury. Of the deformities due to lesions of joints, two were of the hip with destruction of the head of the femur. This was in accord with the observations of Paschlau,[1] who described septic joints and epiphyseal displacements as frequent complications of osteomyelitis in infancy.

PATHOLOGY

In explanation of the differences of the disease in infancy, certain of the local manifestations of the infection must be considered as well as the fact that streptococcic osteomyelitis is more frequent than staphylococcic osteomyelitis. Staphylococcus is liable to give rise to a more destructive process even in infancy. The anatomic construction of the bones and certain physiologic characteristics of this age are factors in delineating the character of the disease. This is discussed in detail in another publication [3] and will be considered in summary fashion here.

Osteomyelitis in infancy almost uniformly has its origin in the metaphysis as it does in older children. Once the infection is under way it follows the path of least resistance [5] (fig. 1). In infants there is a minimal amount of cortical bone at the metaphysis, so that the spread to the subperiosteal space is extremely direct. The periosteum, more loosely attached at this age, is dissected from the cortical bone, and the consequent subperiosteal abscess may rupture into the soft tissues without necrosis of the shaft. This process goes on quite rapidly, and a secondary abscess may be present as soon as the second day after onset. Gross sequestration is rare; what necrotic bone there is is usually absorbed rapidly. Likewise the healing process goes on more rapidly in infancy, as may be seen in the illustrative cases.

REPORT OF CASES

For consideration of the disease, three representative cases are presented.

CASE 1.—B. G., a white girl, aged 1 3/12 years, was admitted May, 5, 1934, with an acute illness and pain in the right shoulder of two days' duration. Three weeks before the onset the infant had had an acute respiratory infection followed by otitis media.

On examination the child was critically ill with a marked swelling of the right arm, maximal at the shoulder, and tenderness over the upper end of the humerus. All motions of the shoulder joint were limited by muscle spasm, but there was no palpable fluid in the joint. Fluctuation was suggested over the anterior aspect of the upper end of the humerus. The temperature was 104 F. Blood examination revealed 25,000 leukocytes.

A diagnosis of osteomyelitis of the humerus was made.

The part was immobilized, poultices were applied, and fluids were forced. The next day the child had definitely improved and fluctuation was definitely present.

3. Green, W. T., and Shannon, J. G.: Osteomyelitis of Infants, Arch. Surg., to be published.

4. Santi, E.: L'osteomielite nei primi anni della vita, Arch. ital. di chir. **38**: 1, 1934.

5. Starr, C. L.: Acute Hematogenous Osteomyelitis, Arch. Surg. **4**: 567-587 (May) 1922. Green and Shannon.[3]

May 6, the day following admission, an incision with drainage of a secondary abscess in the soft tissue was done; the humerus was not disturbed. The wound was packed with petrolatum gauze and the extremity immobilized. Culture from the wound showed Streptococcus haemolyticus.

The temperature was normal on the third postoperative day, and thereafter (fig. 2). Roentgenograms on May 9, showed extensive destruction of the upper end of the humerus with

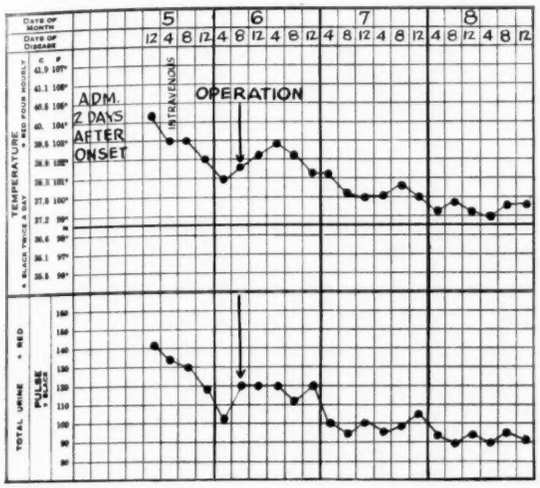


Fig. 2 (case 1).—Clinical chart showing that the high temperature and rapid pulse on admission decreased and the patient's general condition improved on "treating the child" and immobilizing the extremity before operation. Operation: Drainage of a fluctuant abscess, which was done at the optimum time. The temperature was normal on the third postoperative day.

displacement of the epiphysis (fig. 3). Fourteen days later roentgenograms visualized definite healing with new bone (involucrum) surrounding the shaft throughout its length. The wound was healed in six weeks.

June 1, 1935, thirteen months after onset, the extremity was apparently normal, both to physical and to roentgenographic examination.

CASE 2.—J. M. A., a boy, aged 1 year, was admitted April 23, 1934, with an acute illness, sensitivity and swelling of the left lower extremity of six days' duration.

On examination the infant was acutely ill, pale and dehydrated, with an extremely swollen left lower extremity. The swelling and tenderness were maximal over the lower end of the femur. Motion at the knee was markedly limited by muscle spasm, but there was no fluid in the joint. Roentgenograms on admission were negative except for edema of the soft tissues. The temperature was 103 F. The white blood cell count was 26,000.

A diagnosis of osteomyelitis of the femur was made.

The extremity was immobilized and poulticed. Fluids were forced.

On April 24, the day after admission, an incision with drainage of a secondary abscess in the soft tissues was done; the femur was not disturbed. The wound was packed with petrolatum gauze and the extremity was immobilized with plaster. Culture from the wound showed Staphylococcus aureus.

The postoperative convalescence was uneventful; the temperature was normal by the fourth postoperative day. Roentgenograms two weeks after admission showed destruction at the lower end of the femur with an extensive involucrum about the lower two thirds of the shaft. The wound healed in two and one-half months.

On final examination six months later, the extremity was clinically normal and roentgenograms showed little residuum (fig. 4).

CASE 3.—F. H., an infant, aged 1 month, was admitted, June 2, 1932, with an acute illness of two weeks' duration associated with tenderness of the left shoulder. Four days before admission, swelling and redness of the shoulder were noted. Two days before onset a furuncle of the chin was noticed.

On examination the infant was moderately ill with swelling, tenderness and redness of the left shoulder and arm. There was definite fluctuation. Motions of the shoulder joint were limited. Roentgenograms on admission showed extensive destruction of the upper end of the humerus.

A diagnosis of osteomyelitis of the humerus was made.

The day after admission, incision with drainage of a secondary abscess in the soft tissues was done. The humerus was not disturbed. The wound was packed with petrolatum gauze and the part immobilized. Culture from the wound showed Staphylococcus aureus.

Roentgenograms, June 20, showed definite healing of the lesion with extensive involucrum surrounding the lesion. The wound was healed six weeks after operation.

June 1, 1935, three years after onset, the extremity was functionally normal on physical examination. Roentgenograms showed little evidence of the former lesion.

These cases may be considered as typical of the disease. Although any degree of illness may be found, the systemic manifestations are frequently quite severe and are usually noted before the presence of a local lesion is appreciated. The acute illness may often be ascribed to a respiratory infection, since antecedent respiratory infection is common. In our series of cases, 55 per cent gave definite evidence of antecedent infection, half of which were respiratory disorders.

Local sensitivity is soon evident. The child does not move the part and is irritated by handling. Swelling may be noted, occasionally as soon as twenty-four hours after the onset, and soon becomes marked. It is frequently so diffuse as to be of little aid in localizing the site of the lesion. Redness is not a feature, nor is local heat particularly striking. If the lesion has been present for forty-eight hours or longer, thickening of

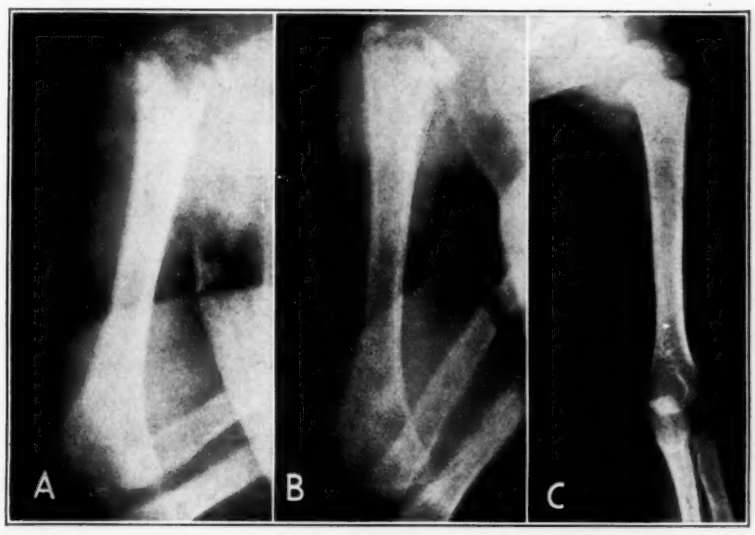


Fig. 3 (case 1).—Osteomyelitis of the humerus—Streptococcus haemolyticus. Operation consisted of drainage of secondary abscess only. *A*, seven days after onset, showing extensive destruction of the humerus with displacement of epiphysis; *B*, two weeks later, showing considerable healing; *C*, one year after onset, showing normal appearance. The patient is now clinically well.

the shaft adjacent to the epiphysis may be suggested, and soon thereafter palpable deep fluctuation may be recognized. Tenderness at the metaphysis, although more difficult to elicit in infants than in older children, is a determining factor in recognizing the exact site of the lesion.

ROENTGENOGRAPHY

It is our constant practice to take roentgenograms, although they are of little positive aid in the diagnosis, in that they do not demonstrate the lesion until from seven to twelve days after the onset. However, they may be helpful in various ways; they may demonstrate the presence of scurvy, syphilis, or an osteomyelitic

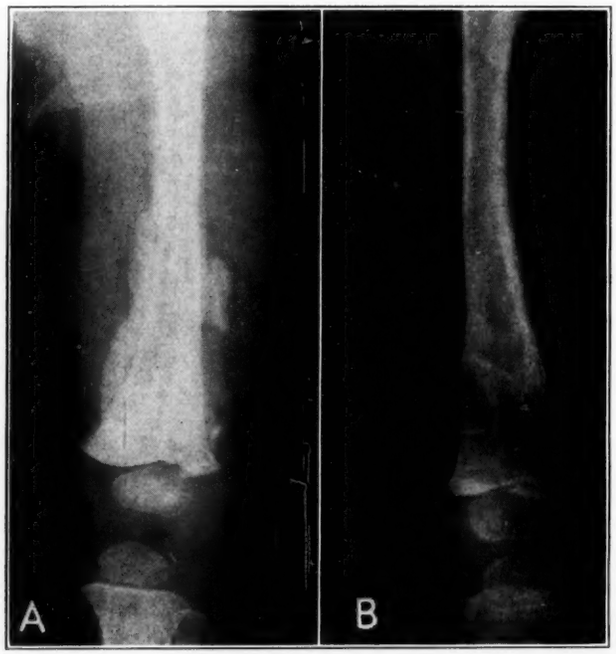


Fig. 4 (case 2).—Acute osteomyelitis of the femur—Staphylococcus aureus. Operation consisted of drainage of the secondary abscess only. *A*, three weeks after onset, showing destruction of the lower end of the femur with extensive involucrum; *B*, six months later, nearly healed. The patient is now clinically well.

lesion of longer duration than the history suggests. The visualization of the soft tissues may be helpful.

Roentgenograms taken to observe the course of the disease are valuable and are very illuminating. Frequently they exhibit extensive destruction with involucrum surrounding the length of the shaft and suggest that gross sequestration will surely occur. One is amazed in subsequent roentgenograms to notice rapid healing without sequestration.

DIFFERENTIAL DIAGNOSIS

Osteomyelitis must be suspected in any infant with an acute illness associated with a sensitive extremity. Other conditions to be considered particularly are abscess (subfascial abscess), septic joint, scurvy and syphilis.

Septic joints are common in infancy. Palpable fluid in the joint with extreme muscle spasm and local sensitivity suggest septic joint. It must be remembered that an effusion into a joint not infected may exist from an adjacent osteomyelitis and that septic joints secondary to osteomyelitis are more common in infancy than at other ages.

Deep abscesses are common in infancy and often are impossible to differentiate from osteomyelitis previous to operation. If the physical signs are maximal away from the metaphysis, it is suggestive of abscess.

Scurvy and syphilis may be recognized by history, multiplicity of lesions, and roentgenograms. Tuberculosis is not difficult to differentiate.

TREATMENT

In acute osteomyelitis of older children there is considerable debate as to the treatment to be adopted—the time of operation, the type of operation and subsequent care. Based on the idea that progressive infection within rigid walls produces increased necrosis, it is, I believe, a prevailing although not universal feeling that operation to "decompress" the infection should be carried out at the earliest possible moment, preferably in the form of a window at the site of the lesion. Whatever the treatment, a long drawn out complicated course is frequent.

In infancy I believe that the indicated therapy is more definite. The prime consideration is the treatment of the acutely ill child, not the local lesion. If the infant survives the acute illness, the disease will be brief, with residuum in the bone unusual. With these considerations in mind we have been able to reduce our mortality in the cases treated from 1931-1934 inclusive to 6.6 per cent. There have been only two deaths in thirty cases and both of these were of infants under 2 months of age who had diffuse sepsis.

Early drainage of the bone does not decrease the amount of destruction, nor does it limit the systemic manifestations. On the other hand, poorly timed, extensive surgery jeopardizes the child's life. There is no haste in performing an operation, and operative procedures must be minimal. The infant should be in the best possible condition at the time of the procedure.

Fig. 5 (case 3).—Osteomyelitis of humerus in child, aged 1 month: Staphylococcus aureus. Operation consisted of drainage of the secondary abscess. *A*, one month after onset, showing destruction with surrounding involucrum; *B*, three years later, apparently normal.

Unless an abscess is palpable and the child is in excellent condition on admission, it is our custom to immobilize the part, apply poultices and give the indicated supportive treatment. Usually the child's condition improves (fig. 2), localization of the process occurs, and the exact site of the lesion may be recog-

nized. Frequently we allow a palpable abscess to form before an operation is done. This occurs quite rapidly.

At operation it is not necessary to carry out a procedure on the bone if the secondary abscess is adequately drained. At any rate, the operation should not be complicated in order to drain the bone. A small window in the bone is permissible but not essential; "the less done, the better." The wound is packed with petrolatum gauze and immobilized, usually in plaster. The first dressing is done in ten days and the wound is repacked at weekly intervals. The interval of ten days before the first dressing allows granulations to form so that the wound is no longer sensitive.

Usually the wound is entirely healed in from four to eight weeks.

The reason for adopting this treatment is that there is less immediate danger to the infant and at least as good a final result as is obtained by any other method. It must be understood that there can be no absolute statements about treatment; individual decisions must be made on individual patients.

CONCLUSION

Osteomyelitis of infancy is a disease of relatively brief duration, with sequestration and recurrences rare and residual lesions in the bone unusual, if the child survives the acute illness.

The mortality rate may be reduced by "treating the child," by allowing localization and by carrying out the minimal surgical procedures.

300 Longwood Avenue.

ABSTRACT OF DISCUSSION

DR. FRANK R. OBER, Boston: Osteomyelitis in infancy is an emergency problem, not as to local condition but as to the life of the child. Twenty years ago at the Children's Hospital in Boston, the plan of treatment was to consider the condition an emergency. This involved an immediate operation on admission of the patient and removal of a piece of bone, tunneling the shaft. The result of such a procedure was a high mortality rate. Postoperative treatment consisted of frequent dressings containing some antiseptic solution. I became convinced that these frequent dressings, which disturbed the patient and caused bleeding from the wound surfaces, did no good. Frequent dressings increase the toxic condition of the patient. In those days the mortality in infants was around 50 per cent, but, as we began to be more conservative in the matter of dressings, the mortality rate decreased. It was not until Dr. Green began his study of osteomyelitis, however, that any of us became aware of the fact that, no matter what was done in the way of surgery, the reaction of the bone was practically the same. Of these ninety-five cases which Dr. Green reports, only six show sequestration. If a child is very ill and his temperature drops, the results are not good if the operation is not performed fairly soon. These infants should be watched very carefully and a definitive operation performed when the general condition of the child is at its best. Usually the operation means, as Dr. Green has pointed out, only a simple incision and drainage of the abscess. This abscess should be packed down to the bone and dressed only once a week. In every case of osteomyelitis it is important that the wound heal from the bottom. Dr. Green is to be commended for bringing to attention that osteomyelitis in infants less than 2 years of age is a different disease from that in the older child.

DR. WILLIAM T. GREEN, Boston: I have considered the mortality during the past five years to be very low. The two deaths in the thirty patients treated during this period have been in infants less than 6 weeks of age who presented multiple septic lesions at the time of admission. There has been one deformity in this time and that was due to epiphyseal displacement. The epiphysis was displaced at the time of admission. I believe that if enough patients are treated there will be a certain number of deformities and a certain number of deaths. I feel that I have been fortunate during the last five-year period and believe that a slightly higher incidence of deformities may be anticipated and a slightly higher mortality rate rather than a lower one. I think that immobilization is an important item in preventing deformities.

TUBERCULOUS LYMPHADENITIS

SECONDARY TO INCONSPICUOUS HEALED TRAUMATIC CUTANEOUS TUBERCULOUS LESIONS

B. N. CARTER, M.D.
AND
JACOB SMITH, M.D.
CINCINNATI

During the past twelve years at the Cincinnati General Hospital, four cases of proved and three of probable traumatic inoculation tuberculosis of the skin with metastasis to regional lymph nodes have been seen. Instances of this condition constitute a very definite but quite unfamiliar group, and for this reason our cases are being reported. The outstanding adenopathy in each case has usually overshadowed the primary focus. With a more accurate knowledge of the pathology and clinical course a more frequent identification of new cases should result.

Very little has been written about healed traumatic tuberculous lesions of the skin with regional lymphadenopathy. Tscherning (quoted by Stokes [1]) in 1888 reported the case of a servant of a tuberculous patient who injured a finger with a fragment of a sputum cup. Subsequently, lymphatic involvement occurred. The finger was amputated and the involved glands were excised, following which the patient recovered. Klebs,[2] in his book published in 1909, mentions extensive tuberculosis of the inguinal glands in an infant resulting from a slight prick of the thigh with a safety pin.

Ceremonial circumcisions occasionally lead to a fatal tuberculosis among the poor Jewish and Mohammedan children. Holt [3] in 1913 collected forty-one such cases, sixteen of which had a fatal termination.

From time to time sporadic articles have appeared, but in each the reported primary lesions have always been well defined. However, two cases of cutaneous tuberculosis associated with trauma were reported by Chancellor [4] in 1914. In one case, a pin which had been carried between the lips of a tuberculous uncle was the offending agent and the method of inoculation was a scratch on the cheek; in the other, the playful bite of a nurse produced the focus on the cheek, which was followed by regional lymphadenopathy, and later innumerable tubercle bacilli were demonstrated in the nurse's sputum. In 1923 Nixon and Short [5] described four cases, three following trauma. The most recent article is by Stokes [1] in 1925 with a report of twelve cases. These will be referred to later.

From the Department of Surgery of the University of Cincinnati College of Medicine and the Cincinnati General Hospital.

1. Stokes, J. H.: Primary Inoculation Tuberculosis of the Skin with Metastases to Regional Lymph Nodes, Am. J. M. Sc. **169:** 722 (May) 1925.
2. Klebs, A. C.: Tuberculosis, 1909.
3. Holt, L. E.: Tuberculosis Acquired Through Ritual Circumcision, J. A. M. A. **61:** 99 (July 12) 1913.
4. Chancellor, P. S.: Beiträge zur Frage des Primäraffektes bei der Tuberkulose, Ztschr. f. Kinderh. **10:** 12, 1914.
5. Nixon, J. A. and Short, A. R.: Tuberculous Chancre, Brit. J. Surg. **10:** 44 (July) 1922.

REPORT OF CASES

CASE 1.—C. C., a white boy, aged 11, in the Cincinnati General Hospital from March 22 to April 18, 1934, ran a nail through the left palm in the web between the first and second fingers two years before admission, and later a lump was noticed in the left axilla. The patient was seen in the surgical clinic two months later, at which time a small nodule was found in

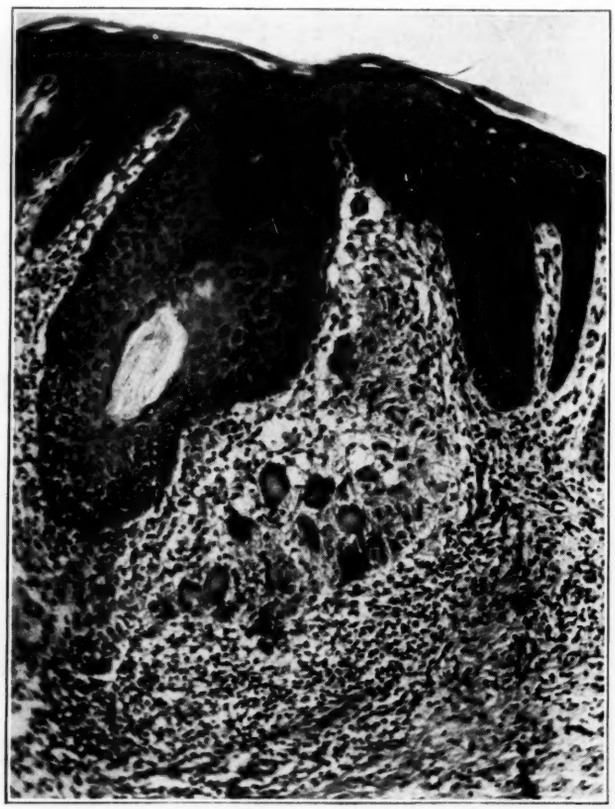


Fig. 1.—Section through the excised healed lesion on the toe in case 4. Note the intact skin over the focus, in which typical tuberculous granulation tissue with giant cells can be seen.

the healed scar at the site of the puncture wound. It measured 6 mm. in diameter and lay deep in the web. This was excised in the outpatient clinic and found to have a caseous center. The microscopic examination revealed tuberculosis. The wound healed rapidly but the axillary glands became larger, more tender and fluctuant. Two weeks later, 4 cc. of pus was aspirated. The smear was negative for tubercle bacilli, and the guinea-pig died too soon to demonstrate tuberculosis. The tuberculin test was four plus. A roentgenogram of the chest revealed only calcification at the hilus. A sinus then formed in the axilla and drained for six months. The size of the axillary nodes remained stationary.

Seven weeks before entry into the hospital, the nodule reappeared in the palm and the axillary mass again became larger and more tender.

At the base of the web between the first and second fingers of the left hand on the palmar surface there was a slightly tender subcutaneous nodule, 1 cm. in diameter, firm but movable In the left axilla was an irregular, hard, moderately tender mass, 4 by 3 by 1.5 cm., high in the apex. It was freely movable and there was no demonstrable sinus.

Radical excision of the glands and of the primary focus was done.

The pathologic diagnosis was tuberculosis of the skin and glands.

The patient was seen one year later, at which time there was no evidence of any recurrence, either in the web between the fingers or in the axilla.

CASE 2.—B. S., a white girl, aged 14, followed in the outpatient surgical clinic of the Cincinnati General Hospital from May 5 to May 26, 1932, cut her right hand on the palmar surface at the proximal part of the thenar eminence while washing dishes, about eight months before coming to the outpatient dispensary. This was just a superficial laceration, but it did not heal for more than two weeks. During this time it drained a moderate amount of pus. It remained a well healed lesion, but three months later the patient noticed a hard tender lump in the right axilla. This disappeared but then reappeared about one month later and from that time continued to enlarge.

There was a healed scar on the right thenar eminence. In the right axilla there were two masses, one 3 by 2 cm., the other 5 by 7 cm. One was firm, slightly tender and irregular without any fluctuation or evidence of secondary infection; the other was fluctuant and appeared as though ready to break down. A roentgenogram of the chest was negative.

Fifty cc. of a grayish fluid was aspirated. The smear was negative for tubercle bacilli, but the guinea-pig was positive. The healed wound was then excised and the larger glands were drained by repeated aspiration. When last seen three weeks after the first visit, the operative wound on the thenar eminence was healed and the glands in the axilla were decreasing in size.

The pathologic diagnosis was tuberculosis of the skin. The clinical diagnosis of tuberculosis of the axillary glands was confirmed by guinea-pig inoculation.

The patient was seen two years later in the gynecologic clinic, where a note was made that the abscess had remained healed.

CASE 3.—G. D., a Negro boy, aged 13, in the Cincinnati General Hospital from Jan. 10 to Jan. 28, 1928, struck his right

Fig. 2.—Section from the femoral glands in case 4.

femoral region, six months before, while working on a vegetable wagon. Soon after a lump appeared there and two weeks after the original trauma a sinus opened and drained. This sinus never closed. The drainage was always scanty. The patient was not questioned about trauma to his leg or foot.

A small white nodule was found at the base of the second toe. The right femoral nodes were enlarged and irregular. There were no sinuses, but two large ulcers were situated on the most prominent regions.

Radical excision of the glands and of the healed scar on the foot was done. The pathologic diagnosis was tuberculosis of the skin and glands. The patient did not return.

CASE 4.—W. H., a Negro boy, aged 9, in the Cincinnati General Hospital from Feb. 10 to April 2, 1930, noticed a swelling in the left groin three months before. One month later this was incised by a physician, and following this there was a moderate amount of purulent drainage. There was never any pain associated with it, nor history of any injury to the foot or leg.

A small hard healed lesion was found on one of the toes. In the left femoral triangle was an ulcer 4.5 by 1.5 cm. with a dirty granulating base. Medial to it was an indurated mass, which was not fluctuant, 5 by 3 cm. in size.

Radical excision of the glands was done and wedge excision of the healed scar on the toe.

The pathologic diagnosis was tuberculosis of the skin and glands (figs. 1 and 2).

The patient did not return.

CASE 5.—J. T., a white boy, aged 10, in the Cincinnati General Hospital from Nov. 1 to Nov. 22, 1923, ran a nail into his left heel four months before admission, and a few days later the heel became red and swollen. His father opened it and some bloody pus was obtained. The wound healed rapidly then, and the child was able to walk on it without any pain. One month later, a small lump appeared in the left groin. The mass was slightly reddened and gradually increased in size but was never painful.

There was a healed scar on the heel, and a mass the size of half an orange in the left femoral region, quite red and fluctuant in its lower portion.

Radical excision of the glands only was performed.

The pathologic diagnosis was tuberculosis of glands.

The patient was seen twelve years later. There was no demonstrable recurrence in the femoral region. The scar on the heel could not be demonstrated. The patient stated that he had been perfectly well.

CASE 6.—H. M., a white boy, aged 10, in the Cincinnati General Hospital from Oct. 21, 1927, to Jan. 17, 1928, had had an injury to his right foot but was unable to give accurate information as to the time of injury in relation to the subsequent lymphadenopathy. The wound healed slowly, but "lumps" appeared "later" in the right femoral region. These broke down and drained and were draining at the time of admission.

The scar was not described in the history. There was marked enlargement of the right femoral nodes, with a sinus draining thick white pus. The local area was quite red. There was no fluctuation present.

Radical excision of the glands only was performed.

The pathologic diagnosis was tuberculosis of the glands.

The patient did not return.

CASE 7.—W. Z., a Negro boy, aged 6, in the Cincinnati General Hospital from March 23 to May 20, 1926, fell from a three-story window three months before and struck his left knee. It became quite swollen and remained so for five weeks. Following this a tender lump appeared in the left femoral region. This persisted and a sinus developed.

The knee was normal at the time of admission into the hospital. No skin lesions, healed or otherwise, could be demonstrated. There were large nodes in the left femoral region, with a draining sinus.

Radical excision of the glands was performed.

The pathologic diagnosis was tuberculosis of the glands.

The patient did not return.

COMMENT

Tuberculosis cutis following trauma is frequently overlooked, especially if the lesion is apparently healed. Tuberculosis of the skin may be initiated in several ways: (1) through the blood stream, (2) by the lymphatic route, (3) by extension from another focus within the body, and (4) by direct inoculation. The type of infection of particular interest is that occurring by direct inoculation associated with trauma, and healed at the time the patient is first seen. Experimentally, transcutaneous tuberculous inoculation can be produced without abrasion or interruption in continuity of the skin, if virulent cultures or sputum teeming with tubercle bacilli is placed on normal skin that has been vigorously massaged or just shaven. Babés and Riegler, Courmont and Lesieur, Fraenkel, Takeya and Dodd (quoted by Calmette [6]) have thus produced tuberculosis in guinea-pigs, rabbits and cattle. Furthermore, transcutaneous infection may not leave behind any residuum, and regional lymphadenopathy does not necessarily follow as a consequential phenomenon.

A study of our first two cases immediately focuses attention on three outstanding features of the primary lesion with its regional adenopathy: (*a*) The initial causative factor was, in each case, some form of trauma, producing an open wound. In one instance it was a puncture wound by a nail; in the other a laceration secondary to a broken dish. (*b*) In both, the primary focus when first seen was healed. This point cannot be stressed or emphasized too strongly, as in four of the remaining five cases the site of apparent inoculation was completely healed at the time of admission to the hospital. In two of these it was excised and proved tuberculous, or a total of four proved healed foci; in the remaining two, just a passing note was made in the

Summary of Cases

Case	Race	Sex	Age	Date	Etiology (Primary Focus)	Glands	Other Tuberculous Glands	Diagnostic Procedures	Operation	Pathologic Condition	Follow-Up
1	White	♂	11	3/22/34 4/18/34	Traumatic; inoculation of web of hand by nail	Axillary	None	Roentgenogram of chest negative	Excision of glands and focus	Tuberculosis of skin and glands	No recurrence 1 yr. later
2	White	♀	14	5/ 5/32 5/26/32	Traumatic; inoculation of thenar eminence of hand by broken dish	Axillary	None	Roentgenogram of chest negative	Excision of focus	Tuberculosis of skin	No recurrence 2 yrs. later
3	Negro	♂	13	1/10/28 1/28/28	Small white nodule at base of 2d toe (no known trauma)	Femoral	None	Roentgenogram of chest negative	Excision of focus and glands	Tuberculosis of skin and glands	None
4	Negro	♂	9	2/10/30 4/ 2/30	Small lesion on the toe (no known trauma)	Femoral	None	Tuberculin 4 plus	Excision of focus and glands	Tuberculosis of skin and glands	None
5	White	♂	10	11/ 1/23 11/22/23	Traumatic?; inoculation of heel (not proved)	Femoral	Enlarged hilar glands	Roentgenogram of chest negative; tuberculin negative	Excision of glands	Tuberculosis of glands	No recurrence 12 yrs. later
6	White	♂	10	10/21/27 1/17/28	Traumatic?; inoculation of foot (not proved)	Femoral	Enlarged mediastinal glands	Roentgenogram of chest negative; tuberculin negative	Excision of glands	Tuberculosis of glands	None
7	Negro	♂	6	3/23/26 5/20/26	No lesion demonstrable, but history of cut on knee	Femoral	None	Tuberculin positive	Excision of glands	Tuberculosis of glands	None

6. Calmette, Albert: Tubercle Bacillus Infection and Tuberculosis in Man and Animals, Baltimore, Williams & Wilkins Company, 1923.

history of one and in the other no consideration was given it. (*c*) The interval of time between the traumatic inoculation and the appearance of regional lymphadenopathy was of some length; in one case three months, in the other just "later." Another case (J. T.) had a time interval of one month. The most prominent feature of this condition is the adenopathy, and it is usually this that brings the patient to seek medical attention. Since there is such a relatively long interval between the time of skin inoculation and the appearance of regional adenopathy, the possibility of a primary focus is frequently overlooked.

In completing the analysis of our remaining five cases, little can be added to the foregoing. Each contains one or more features of the first two typical cases and merely reemphasizes the points mentioned.

The lymph glands that may become involved are the cervical, axillary and inguinal groups. Tuberculosis of the cervical nodes, or "scrofula," is an infrequent sight now because of careful supervision of dairy herds and the widespread removal of enlarged infected tonsils. In this series there were no cases of cervical adenitis secondary to cutaneous lesions. Femoral lymphadenopathy was present in five of the cases and there were only two with involvement of the axillary nodes. All but one case (B. S.) were treated by radical excision and were proved tuberculous on microscopic section.

Roentgenograms of the chests of two patients demonstrated enlarged mediastinal glands, but in none was there any further involvement of any other group of lymph nodes other than the regional.

According to all writers, the human form of the tubercle bacillus is the one most commonly encountered in cutaneous lesions. Unfortunately we have no bacteriologic studies in our cases.

Very little data can be obtained from our cases as to the clinical pathology of the primary lesion. However, Stokes [1] in 1925 reported ten cases of undoubted and two of probable inoculation tuberculosis of the skin with an excellent description of the usual traumatic inoculation site. Of his ten proved cases, five were on the face, three on the forearm and hand, and two on the foot. Only three occurred in children, aged 2, 4 and 5, three at the ages of 13, 16 and 17, and four in adults. The sex was evenly divided, five females and five males. In our series there were no adults, the patients all being children between the ages of 6 and 14; six males to one female; four white and three Negroes.

Of particular interest are several of Stokes' cases illustrating features of paramount importance from the diagnostic and therapeutic standpoints. In his first case there were present large cervical and preauricular glands with multiple draining sinuses. Above the right malar prominence there was a small depressed scarlike lesion about 1 cm. in diameter, around which a few apple-jelly nodules could be demonstrated in a faintly pink areola. "This apple-jelly nodule is a tubercle in the deeper layers of the corium or in the fat which, though ordinarily invisible, can be detected by expressing the blood from the tissue with a glass spatula. These nodules are not absolutely characteristic; however, they are a helpful guide to diagnosis and are the first feature to arouse suspicion at a site of traumatic inoculation."

In two of Stokes' cases there was a recurrence of adenitis following excision. No primary focus had been identified. After the recurrence, search was made and an inconspicuous focus found. These were excised, with subsequent healing, which was permanent. "These cases furnish excellent examples of the continuous vicious activity of the 'feeder focus' and the benefit derived from its removal." Another of his patients received rather intensive roentgen therapy to the primary lesion but without effect. After excision, activity was demonstrated indicating the ineffectiveness of the roentgen ray in dealing with the primary site of inoculation.

CONCLUSIONS

1. Tuberculous lymphadenitis may occur secondary to a focus of a traumatic tuberculous inoculation in the skin.
2. The interval between traumatic inoculation and the appearance of regional lymphadenopathy may be of such length that the primary lesion may be healed and consequently overlooked.
3. Because of the inconspicuousness of the primary lesion, very little consideration is directed toward it.
4. Chronic lymphadenopathy subsequent to even remote trauma of an extremity should immediately arouse suspicion and incite careful search for a tuberculous cutaneous focus. This is especially important in the study of solitary involvement of the axillary, epitrochlear and inguinal lymph nodes.
5. Surgical excision of the site of inoculation, even though healed and apparently innocuous, should precede any active medical or surgical procedures directed toward the adenopathy.

PROGRAM FOR TUBERCULOSIS CONTROL IN PUERTO RICO

EDWARDO GARRIDO MORALES, M.D., DR.P.H.
Commissioner of Health
SAN JUAN, P. R.

Tuberculosis, for the year ended December 1934, ranked as the first cause of death in Puerto Rico. In many other countries the death rate from this disease, especially during the past twenty-five years, has had a downward trend, but in Puerto Rico it has shown a steady rise, demonstrated by the average annual rates of 170.5 in 1910-1914, 201.4 in 1920-1924 and 295.3 in 1930-1934 per hundred thousand of population. The last rate is approximately five times the death rate from tuberculosis in the United States registration area.

Among the important factors presumably responsible for the increase of the tuberculosis mortality in Puerto Rico, cognizance should be given to overcrowding in urban districts as a result of migration of families from rural areas to city slums; the lack of employment, which brings overcrowding in dwellings; the relatively low economic status of the island population, and the lack of hospital facilities for the isolation of the tuberculous.

According to studies carried out by the Insular Department of Health, the tuberculosis mortality in the island is 17 per cent higher in women than in men, 19 per cent higher in the Negro than in the white race, and 84 per cent higher in the urban than in the rural districts. Approximately 68 per cent of children under 15 react positively to the intradermal tuberculin test, the incidence of positive reactors being 37 per cent higher in urban than in rural districts. Clinical evidence and autopsy results have revealed that the chronic fibrocaseous type of the disease is the predominant form. Pulmonary tuberculosis is responsible for 97 per cent of all deaths from this disease. Human tuberculosis of bovine origin is comparatively rare.

Read at a meeting of the Pan American Medical Association held at the Antituberculosis Hospital, Rio Piedras, P. R., July 29, 1935.

In view of the importance of tuberculosis as a health problem in Puerto Rico, the present administration of the health department formulated a program to intensify its efforts to control the disease. This program included the following:

(*a*) Intensification of the tuberculosis work in the dispensaries of the public health units, which are the case finding agencies under the health department.

(*b*) Isolation of the largest possible number of cases of open pulmonary tuberculosis in four district hospitals with a total capacity of 1,500 beds, adequately equipped for giving proper treatment.

(*c*) Organization of ten antituberculosis centers, each in charge of a tuberculosis specialist, to whom cases are referred for diagnosis and selection before admission to the hospitals.

These centers also serve as collapse clinics for the application of pneumothorax treatment to patients after they leave the hospitals.

(*d*) Two traveling clinics to provide x-ray facilities and pneumothorax treatment for rural municipalities.

(*e*) An educational campaign, especially through the public health units and the public schools of the island.

(*f*) Intensification of preventive measures by increasing the number of rest rooms in the public schools and increasing the number of preventorium beds, activities under the management of the Commission for the Prevention of Tuberculosis in Children of School Age.

(*g*) Eradication of tuberculosis in cattle.

TUBERCULOSIS DISPENSARIES WITH VISITING NURSES

Before 1934 there were twenty health units in the island, comprising thirty-eight municipalities and serving a population of 1,054,575, or 68 per cent of the island population. At present there are fifty-four municipalities served by health units, with an aggregate population of 1,300,767. Each health unit has a full-time medical officer, one or more public health nurses, one or more sanitary inspectors, a clerk-microscopist and a caretaker. Tuberculosis control is an important feature of the work of these health units. At present they have a staff of thirty full-time and fifteen part-time physicians and 154 visiting nurses. There are in Puerto Rico fifty-eight tuberculosis dispensaries, attached to the public health units of fifty-four municipalities. At least one fourth of the time of the personnel of these public health units is being devoted to tuberculosis work.

TUBERCULOSIS HOSPITALS

We consider the isolation of open cases of tuberculosis among the most urgent measures in a country, such as Puerto Rico, where tuberculosis mortality is excessively high and where the standards of living of a large proportion of the population are so low that effective isolation of the tuberculous patient in the home is out of the question in most cases.

Previous to the year 1934 there were 550 hospitals beds available in the insular institutions for the isolation of tuberculous patients. The average yearly number of deaths from tuberculosis during the last five years has been 4,500. According to the standards of the National Tuberculosis Association at least one bed per annual death is required for an effective antituberculosis campaign. Considering these facts, funds were obtained from the Puerto Rico Emergency Relief Administration for the construction of ten hospital units with a total capacity of 1,000 beds. A campaign was organized to raise funds for their equipment, and the insular legislature, realizing the seriousness of this problem, has provided adequate funds for their maintenance through a lottery bill, approved in the last session of the insular legislature.

Although the number of beds available at present in insular institutions for the isolation of tuberculous patients is only about one third of what it should be in accordance with the recognized standards of one bed for each annual death from this disease, this represents, nevertheless, a large effort in the control of tuberculosis. It is proposed that the hospital beds available will be used to a large extent for the elimination of the open cases through the use of such modern measures of collapse therapy as will convert the positive sputum case into a negative case in as short a time as possible.

ANTITUBERCULOSIS CENTERS AND TRAVELING CLINICS

The Antituberculosis Center, which is a new feature added to the tuberculosis work in Puerto Rico, is an important part of our program. Each center is in charge of a physician specialized in tuberculosis work and is well equipped with fluoroscopic and other facilities for the diagnosis and treatment of tuberculosis.

The specialist in charge of the center serves as a consultant to whom the health officers may refer difficult cases for diagnosis. He also administers pneumothorax treatment to ambulatory patients after they leave the hospitals.

At present four centers are functioning. Six others will be opened during the present year. A traveling clinic, with x-ray equipment and facilities for pneumothorax treatment, is also available for rural municipalities.

It is proposed that each center shall take care of 100 pneumothorax cases besides giving expert advice to health officers in obscure cases. In this way 1,000 additional open cases of pulmonary tuberculosis can be kept from spreading infection in the home and together with the 1,500 isolated in the four district hospitals will make a total of 2,500 cases under control.

EDUCATIONAL ACTIVITIES AND PREVENTIVE MEASURES

The common dictum that "An ounce of prevention is worth a pound of cure" applies in tuberculosis work as well as in any other transmissible disease. Unfortunately, the value of preventive measures in tuberculosis work in Puerto Rico is limited by the relatively poor economic status of the island population and the exceedingly low standards of living of the great majority of the inhabitants. However, the education of the people in the modes of spread of the disease and the essential features of prevention are carried out through conferences by health officers and nurses, and by the distribution of pertinent literature and pamphlets. A moving picture has recently been prepared, which will also be used in connection with educational activities.

The number of rest rooms in the public schools as well as the number of preventorium beds have been almost doubled this year. Undernourished children, especially contacts of tuberculous patients, are taken care of in these rest rooms.

ERADICATION OF TUBERCULOSIS IN CATTLE

Although human tuberculosis of bovine origin is not a serious problem on the island because of the habit of boiling the milk before use, nevertheless the danger of its spread has increased with the recent tendency to use raw milk brought about with the introduction of electrical refrigeration in the homes of the middle class.

On this account a cooperative plan for tuberculosis eradication in cattle has been approved between the federal and insular departments of agriculture and the insular department of health. There are at present seven veterinarians doing intensive tuberculin tests on the island, and 29,380 cattle have already been tested, of which 731, or 2.4 per cent, have reacted positively and have been slaughtered.

The federal government pays an indemnity of $50 for each slaughtered animal of pure breed and $25 for each animal of mixed breed that is slaughtered.

Since experience has demonstrated that positive reactors are found to a large extent among imported breeds of cattle, the present law provides that imported cattle must have a certificate from a veterinarian accredited by the federal government, to the effect that they are free from tuberculosis.

SUMMARY

The tuberculosis program in Puerto Rico has been formulated on sound epidemiologic grounds in an effort to protect the community rather than the individual case.

The search and location of the largest number of open cases through the dispensaries in the public health units, their isolation in adequate hospitals until they have been changed from sputum positive to sputum negative by means of collapse therapy, and the continuation of refills in well equipped antituberculosis centers in order to keep the patients free of tubercle bacilli in the sputum, together with some degree of education of the public and the eradication of tuberculosis in dairy cattle, are measures in which we have great hopes.

Clinical Notes, Suggestions and New Instruments

PNEUMOCOCCIC MENINGITIS: REPORT OF A CASE WITH RECOVERY FOLLOWING CISTERNAL DRAINAGE

P. R. MEYER, M.D., PORT ARTHUR, TEXAS

It has always been the general impression that pneumococcic meningitis is practically hopeless. The more one searches the literature, however, the more cases of recovery one finds. The methods of treatment of this condition have been varied. Those with successful recoveries feel that their form of treatment was responsible for the happy conclusion. For example, Weinberg [1] used potassium permanganate following the suggestion of Nott. Reveno and McLaughlin [2] used Felton's serum alone, intravenously, intraspinally as well as intrathecally, although mentioning the use of the antipneumococcus serum combined with ethylhydrocupreine hydrochloride (optochin). Lynch [3] also used Felton's serum, and McAuley and Hilliard [4] report a case in which Felton's serum was used. Eichelbaum [5] used spinal drainage, lavage and intraspinal injections of antipneumococcus serum, for which he concluded that recovery in his case was responsible. Mella [6] used subarachnoid lavage and ethylhydrocupreine with good results. Roussel [7] used large doses of methenamine. Rohrbach [8] used Felton's serum in a case of type IV, with recovery. Shuller,[9] in reviewing the literature, refers to five recoveries in which treatment was given by various means besides those just mentioned; one was treated with intracarotid injection of colloidal solution of iodine and acriflavine base; in another, Homton's antibody solution intramuscularly and intradermally and ethylhydrocupreine hydrochloride were used. His own patient was given Mulford's pneumococcus antibody solution. Ashmun [10] used ethylhydrocupreine hydrochloride intraspinally and acriflavine base in his two cases. Kolmer [11] believes that when pneumococci are found in the spinal fluid, pneumococcus antibody solution or antipneumococcus serum should be given intravenously and that the intraspinal injection of a mixture of 25 cc. of pneumococcus antibody solution, or polyvalent antipneumococcus solution, with 1 cc. of 1:100 solution of ethylhydrocupreine hydrochloride should be instituted after removal of the fluid. Intracarotid injection of the same mixture should also be given. He states, however, that in diffuse meningitis continuous and even surgical drainage should be used. Harkavy [12] used Felton's serum and considers it responsible for the sterilization of the spinal fluid and subsequent recovery. Globus and Kasanin [13] used only repeated lumbar and cisternal punctures, although they feel that serum therapy does have its place. Amesse [14] reports that his patient received only a daily spinal drainage. Bedell's [15] patient also was treated without the use of serum and with cisternal and lumbar drainage and irrigations; however, in her case a rubber drainage tube was inserted into the cisterna magna for continuous drainage.

As to the type of pneumococcus that is the causal agent, Bauer and St. Clair [16] report type III to be most common in cases following otitis media, and type IV in cases without a history of otitis media. Unfortunately in the case to be reported the organism was not typed.

REPORT OF CASE

J. R. M., aged 5 years, became ill, Monday, March 4, 1935, and complained of headache and fever. The past history and family history were irrelevant. The physician who saw the child diagnosed a digestive upset. Fever continued to be high and the child began to vomit. March 6 the patient was seen by another physician, who also diagnosed the condition as a digestive disorder. When seen by me the morning of March 7 the temperature was 105.4 F. The child was alert and complained of a slight headache; otherwise there was no discomfort. As I entered the room the patient had just finished drinking a glass of water. I was sitting in the chair about 2 feet from the bed when the child suddenly and without any effort vomited. The force was so great that very little fell to the floor, the majority reaching my chair.

Physical examination revealed only slight anterior nuchal rigidity, an acutely reddened pharynx, an absent Babinski reflex, absent knee jerks, and positive Brudzinski and Kernig signs; otherwise the examination was negative. A spinal puncture was made and a thick cloudy fluid under some increase in pressure was removed. This fluid was sent to the laboratory and hospitalization was advised.

The fluid on examination had a cell count of 3,500, globulin 4 plus and no sugar reduction, but no organisms were found. A culture of the fluid was taken, but subsequent examination failed to reveal any organisms. Fifteen cubic centimeters of meningococcus serum was given intraspinally after removal of

1. Weinberg, M. H.: Case of Pneumococcus (Type III) Meningitis Treated with Potassium Permanganate: Recovery, J. Nerv. & Ment. Dis. **74:** 38 (July) 1931.
2. Reveno, W. S., and McLaughlin, Nelson: Pneumococcic Meningitis: Recovery with Felton's Serum, Ann. Int. Med. **7:** 1026 (Feb.) 1934.
3. Lynch, L. J.: Pneumococcus Meningitis with Recovery, New England J. Med. **203:** 257 (Aug. 7) 1930.
4. McAuley, J., and Hilliard, F. M.: Recovery from Pneumococcal Meningitis, Brit. M. J. **1:** 139 (Jan. 28) 1933.
5. Eichelbaum, H. R.: An Unusual Case of Cerebrospinal Meningitis Due to the Pneumococcus Lancelatus and Its Recovery, Medical Department, United Fruit Co.
6. Mella, Hugo: The Use of Subarachnoid Lavage and Ethylhydrocupreine in Meningitis, U. S. Vet. Bur. M. Bull. **7:** 77-78 (Jan.) 1931.
7. Roussel, A. E.: Pneumococcus Meningitis Simulating Diabetic Coma with Recovery, Atlantic M. J. **30:** 159 (Dec.) 1926.
8. Rohrbach, H. O.: Pneumococcic Meningitis with Recovery, Pennsylvania M. J. **32:** 646-647 (June) 1929.
9. Shuller, E. H.: Pneumococcic Meningitis, J. Oklahoma State M. A. J. **25:** 137 (April) 1932.
10. Ashmun, S. H.: Pneumococcic Meningitis Combined with Streptococcus and Diplococcus Catarrhalis, Ohio State M. J. **29:** 243-246 (April) 1933.
11. Kolmer, J. A.: Pneumococcic and Streptococcus Meningitis, J. A. M. A. **92:** 874-877 (March 16) 1929.
12. Harkavy, Joseph: Pneumococcic Meningitis: Recovery with Serum Therapy, J. A. M. A. **90:** 597-599 (Feb. 25) 1928.
13. Globus, J. H., and Kasanin, J. I. Pneumococcic (Type IV) Meningitis, J. A. M. A. **90:** 599-601 (Feb. 25) 1928.
14. Amesse, J. W.: Pneumonoccic Meningitis: Report of a Case with Recovery, Colorado Med. **28:** 361-362 (Aug.) 1931.
15. Bedell, Caroline C.: Pneumococcic Meningitis: Report of a Case with Recovery Following Cisternal Drainage, J. A. M. A. **102:** 820-822 (March 17) 1935.
16. Bauer, J. T., and St. Clair, Huston: Pneumooccus Types in Acute Mastoiditis and "Primary" Pneumococcus Meningitis, J. A. M. A. **90:** 1429-1930 (May 5) 1928.

more fluid, and 15 cc. was given intravenously. The child was also given 300 cc. of citrated whole blood by transfusion. The fluid examination made after admission to the hospital showed a cell count of 3,100, globulin increased, and no sugar. A smear of fluid revealed many pus cells; occasionally gram-posittive intracellular diplococci were found. Culture of the fluid, March 8, revealed gram-positive diplococci and short chain streptococci (contamination not excluded). The white blood count was 13,900; neutrophils 75 per cent, large lymphocytes 3 per cent, small lymphocytes 22 per cent. Analysis of the urine revealed a specific gravity of 1.020, a distinct trace of albumin, no sugar, a few pus cells, and many fine and coarse granular casts.

On spinal puncture, made by Dr. C. M. Beavens, the fluid was cloudy and under increased pressure. This fluid was taken to the laboratory of Dr. Hinkle Garst, who made only a smear. The gram-positive diplococcus was also seen here. Because of the negative smear and culture on the first tap, while we waited for confirmation of the gram-positive diplococci and in order not to lose any ground gained, 15 cc. of meningococcus serum was given intraspinally and 15 cc. intravenously. That evening a cisternal puncture was made and 30 cc. of cloudy fluid was removed. The cell count was 2,800; smear and subsequent culture were negative.

March 9 there was decreased vomiting; the patient complained less of head pain and could bend the neck more easily. Cisternal puncture was made at 9:45 a. m. and 30 cc. of fluid was removed, which was less cloudy and under less pressure; the cell count was 2,700. Cisternal puncture was made at 7:30 p. m. and 15 cc. of fluid was removed. The cell count was 2,800; the temperature varied from 99.6 to 102.4 F.; smear and subsequent culture were negative.

March 10 at 10:45 a. m. 15 cc. of fluid was removed by cisternal puncture. The cell count was 2,500. The condition seemed to be improving. There was no vomiting, and a smear revealed many pus cells and occasional gram-positive diplococci; subsequent culture revealed gram-positive diplococci. The fluid still showed on examination increased globulin and no sugar. At 6 p. m. a cisternal puncture was done, but after removal of almost 6 cc. of bloody fluid the needle was withdrawn for fear of doing damage, as the child was so restless. The fluid was not sent to the laboratory.

March 11 at 9:15 a. m. 15 cc. of fluid was removed by cisternal puncture; the cell count was 350; smear was negative and the temperature varied between 99.6 and 103 F. The mental condition was clear and the child was feeling much better.

March 12 at 10 a. m. 22 cc. of fluid was removed by spinal puncture in order to determine the presence or absence of any block; the cell count was 250, the pressure was still diminishing and the fluid was much clearer. There was a slight increase of globulin and a faint trace of sugar. Fluid was cultured at 7:30 p. m., a cisternal puncture was made and 24 cc. of fluid was removed. The cell count was 75.

March 13 at 9 a. m. 27 cc. of fluid was removed by cisternal puncture; it showed that the fluid was still clearing up; the cell count was 60. It was decided to do cisternal punctures only once a day instead of twice a day from now on.

March 14 the mental condition was very good. Twenty-three cubic centimeters of fluid was removed at 9 a. m. by cisternal puncture. The cell count was 40; culture was made.

March 15 at 9:15 a. m. 22 cc. of fluid, which was becoming quite clear, was removed by cisternal tap. The cell count was 38 and culture was negative after seventy-two hours.

March 16 at 9:30 a. m. 15 cc. of fluid was removed by cisternal puncture; the cell count was 20. The temperature was now between 99 and 100 F.; a culture was taken.

March 17 at 1 p. m. 6 cc. of fluid was removed by spinal tap by Dr. C. M. Beavens. The cell count was 30 and culture was negative after seventy-two hours.

March 18 at 9:45 a. m. 30 cc. of fluid was removed from the cistern. The fluid was clear and the cell count was 15; a culture was taken.

March 19 at 9:45 a. m. 15 cc. of fluid was removed by cisternal tap. The cell count was 21, and culture was negative after seventy-two hours. Globulin was normal and there was a trace of sugar.

March 20 at 9:30 a. m. 20 cc. of fluid was removed by cisternal puncture; the cell count was 10 and the temperature normal.

March 21 at 9 a. m. 30 cc. of fluid was removed by cisternal puncture. The cell count was 10; culture was negative after seventy-two hours.

March 22 at 9 a. m. 15 cc. of fluid was removed cisternally. The cell count was 12. In the face of four negative spinal fluid cultures, normal temperature and absent signs or symptoms of any sort, the child was discharged.

About ten days after leaving the hospital and returning home the child developed a lobar pneumonia, involving the right upper lobe. This was also followed by recovery.

COMMENT

It is not my purpose in this paper to criticize other treatments advised but merely to report another recovery and the therapy used. Such simple treatment as was used, being so successful, brought up the thought that pneumococcic meningitis, like pneumococcic pneumonia, might be self limited in its duration. In other words, if life can be continued by reducing pressure within the skull and giving supportive treatment, such as transfusions and fluids used, will pneumococcic meningitis end of its own accord as will pneumonia caused by the same organism?

601 Fifth Street.

PNEUMOCOCCIC CEREBROSPINAL MENINGITIS WITH RECOVERY

HOMER R. SMITH, M.D., MINNEAPOLIS

The report of this case of recovery from a pneumococcic cerebrospinal meningitis has been urged on me because it may be of some help to others and because it adds a little hope to a very desperate situation. The case was uncomplicated and the only etiologic factor was a mild so-called head cold about two weeks previous to the seeking of help.

Mrs. L., aged 43, first seen the morning of Aug. 23, 1935, complained of an intense headache beginning two or three days before and gradually getting worse. In addition there was some pain in the neck, worse on the right side, and with considerable stiffness in attempted motion of any kind. The pulse was 88 and the temperature 101. The eyes reacted to light and in accommodation, and all the reflexes of the extremities were normal or nearly so. Nothing abnormal was heard in the lungs or heart sounds, although there was a history of a moderate cold about two weeks before. That evening the temperature rose to 104 and the leukocyte count taken then was 18,000. The next forenoon the patient was admitted to St. Barnabas Hospital. All the symptoms regarding the head and neck were worse, the temperature was 103.8 F. and the leukocyte count was 28,000. Urinalysis was negative.

A diagnosis of some kind of meningitis was made and a spinal puncture done for diagnosis. The spinal fluid came slowly in drops that were slightly bloody and cloudy. The laboratory examination of the fluid by Dr. Floyd Grave revealed: Nonne reaction, a heavy trace; red blood cells, numerous; white blood cells, 1,060 per cubic millimeter. Smears with the Gram stain showed a few gram-positive diplococci (pneumococci). A roentgen examination of the lungs by Dr. R. W. Morse showed only a diffuse congestion.

It was thought that treatment with antipneumococcus serum should be attempted regardless of the report on the types present. The Felton serum, 20,000 units of types I and II combined, was given intravenously the next day, August 25, repeated intramuscularly in one hour and again repeated intravenously in three hours from the first dose. The temperature, which was 105.8 by rectum August 25, dropped steadily each day, reaching normal August 31. On the same day it again began going up, reaching 104 at noon of September 2, with a leukocyte count of 30,000. The antipneumococcus serum was repeated intravenously and intramuscularly much the same as before, with a prompt drop of temperature to normal on the next day.

There were some minor fluctuations in temperature for the next three days but no more serum was used. The pulse and respiratory rates responded in their usual manner. During the

illness Dr. G. L. Doxey reported all sinuses clear by transillumination. The patient left the hospital without complications September 17 and has continued an uneventful convalescence.

I regret that through some misadventure the pneumococci in the spinal fluid were not typed; therefore it must be presumed that they were in the groups acted on favorably by the antipneumococcus serum.

612 Medical Arts Building.

Special Article

NONSPECIFIC PROTEIN THERAPY

A NUMBER OF FIRMS ARE ADVERTISING NONSPECIFIC PROTEIN PREPARATIONS UNDER PROPRIETARY AND SOMETIMES MEANINGLESS NAMES. RELATIVELY FEW OF THESE PREPARATIONS HAVE BEEN SUBMITTED TO THE COUNCIL ON PHARMACY AND CHEMISTRY AND NO PROPRIETARY NONSPECIFIC PROTEIN PREPARATION HAS BEEN ACCEPTED FOR INCLUSION IN NEW AND NONOFFICIAL REMEDIES. BELIEVING THAT PHYSICIANS DESIRE A MORE EXTENSIVE PRESENTATION OF INFORMATION CONCERNING NONSPECIFIC PROTEIN PREPARATIONS, THE COUNCIL ON PHARMACY AND CHEMISTRY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING REVIEW. IN ADOPTING THIS REPORT, THE COUNCIL EXPRESSES APPRECIATION TO THE AUTHOR OF THE ARTICLE, DR. RUSSELL L. CECIL, AND TO DR. LUDVIG HEKTOEN, WHOSE ARTICLE WAS PUBLISHED IN THE JOURNAL NOVEMBER 30.

PAUL NICHOLAS LEECH, Secretary.

RUSSELL L. CECIL, M.D.
NEW YORK

Nonspecific protein therapy recently celebrated its twentieth anniversary. Like many other new forms of medical treatment, it has had its ups and downs, its defenders and detractors. If during the past few years it has lost some of its former popularity, one need not be surprised, for this has been the fate of most new methods of therapy. Furthermore, whatever prestige protein therapy has lost through the excessive enthusiasm of its supporters is being regained, at least in part, by reason of a better understanding of the fundamental nature of the reactions that follow its use.

In 1913 Fernando Torres,[1] a South American, reported successful results in the treatment of typhoid fever by giving typhoid vaccine intravenously and described the sharp reactions that followed its injection. Typhoid vaccine had been used previously to this in the treatment of typhoid, but the injections had always been given subcutaneously. In 1914 Dessy, Grapiolo and Fossati,[2] also Argentinians, published a paper on the treatment of typhoid with typhoid vaccine. In this article the results obtained by subcutaneous injection were compared with those which followed intravenous injection. The authors concluded that the intravenous method gave much quicker results and described intravenous vaccine therapy in typhoid as a "brilliant" form of therapy. In 1914 Kraus and Mazza[3] treated typhoid with intravenous injections of typhoid vaccine and noted that many cases so treated terminated abruptly by crisis or rapid lysis and that the mortality rate was definitely reduced. In the same year Ichikawa[4] also reported favorably on this form of treatment. No doubt this method of vaccine treatment was originally intended as a form of specific therapy, but when Kraus and his co-workers[5] later obtained similar results with colon bacillus vaccine they opened the door to nonspecific therapy in all its various forms and modifications. Shortly after this, Lüdke[6] showed that excellent results could be obtained in typhoid with intravenous injections of albumose, and Schmidt[7] found that intramuscular injections of boiled milk would produce febrile reactions. Since then a large number of different agents, many of them proprietary, have been advocated, some for intravenous, others for intramuscular, use.

Miller and Lusk[8] in 1916 were the first to use "fever therapy" in the United States, when they reported favorably on the intravenous use of typhoid vaccine in arthritis. About this time V. C. Vaughan[9] was writing about poisonous proteins, maintaining that the keystone of the protein molecule was the "protein poison" and that fever was due to the parenteral destruction of proteins. Vaughan pointed out that the parenteral introduction of bacteria, pathogenic or nonpathogenic, living or dead, was followed by fever and that the fever was not the result of the growth of the bacteria but of bacterial destruction and splitting up of bacterial protein.

A distinction must be made between the terms "foreign protein therapy" and "nonspecific therapy." The latter is a broader term, including chemotherapy as well as protein therapy. In the present article, discussion will be limited to protein therapy.

PROTEINS USED

Many forms of protein and protein derivatives have been tried therapeutically. Among the more important may be mentioned:

1. Native proteins, such as egg albumin, milk and casein.
2. Serums, either human or animal.
   (*a*) Normal serum.
   (*b*) Immune serums, especially diphtheria antitoxin.
3. Protein split products, including peptone, proteose, albumose and histamine.
4. Enzymes and tissue extracts.
5. Bacterial vaccines.
6. Bacterial extracts (tuberculin, Coley's fluid and the like).

Malarial therapy is a form of foreign protein treatment. The protein is set free in the blood of the patient when segmentation of the malarial parasite occurs. The application of bee stings in various rheumatic conditions is probably another instance of protein therapy.

During the last few years a great many commercial protein products have been put on the market. Some of these are derived from milk, others from vegetable proteins, while still others are prepared from bacteria.

At the present time the three proteins most frequently used in America are typhoid vaccine, boiled milk and diphtheria antitoxin. A number of the commercial preparations also enjoy a considerable vogue. Stock and autogenous vaccines of various kinds are used extensively for therapeutic purposes, often no doubt with the intention of stimulating a specific rather than a nonspecific reaction, though there is little evidence to support the belief that a specific antigen-antibody mechanism is involved.

METHODS OF ADMINISTRATION

1. *Milk.*—Ordinary skimmed milk, either fresh or pasteurized, is boiled for from five to ten minutes and then cooled to body temperature. The first dose for

From the Department of Medicine, Cornell University Medical School.

1. Torres, F. R.: Vacunoterapia ò antigenoterapia antifica, Semana méd. **22**: 1557 (Dec. 25) 1913.
2. Dessy, S.; Grapiolo, F. L., and Fossati, V.: Neuva vacuna contra la fiebre tifoidea: Notas experimentals y clinicas, Semana méd. **21**: 357 (Feb. 12) 1914.
3. Kraus, R., and Mazza, S.: Zur Frage der Vaksinetherapie des Typhus abdominalis, Deutsche med. Wchnschr. **40**: 1556, 1914.
4. Ichikawa, Sadakichi: Abortivbehandlung von Typhösen Krankheiten, Ztschr. f. Immunitätsforsch. u. exper. Therap. **23**: 32, 1914.
5. Kraus, R.; Penna, J., and Bonorino, Cuenca, J.: Ueber Heterobakterientherapie, Wien. klin. Wchnschr. **30**: 869, 1917.
6. Lüdke, H.: Die Behandlung des Abdominaltyphus, mit intravenösen Injectionen von Albumosen, München med. Wchnschr. **62**: 321, 1915.
7. Schmidt, R.: Ueber Proteinkörpertherapie und über parenterale Zufuhr von Milch, Med. Klin. **12**: 171, 1916.
8. Miller, J. L., and Lusk, F. B.: The Treatment of Arthritis by the Intravenous Injection of Foreign Protein, J. A. M. A. **66**: 1756 (June 3) 1916; The Use of Foreign Protein in the Treatment of Arthritis, ibid. **67**: 2010 (Dec. 30) 1916.
9. Vaughan, V. C.: Protein Fever: Poisonous Proteins, J. Lab. & Clin. Med. **2**: 15 (Oct.) 1916.

adults is 5 cc. injected intramuscularly, usually into the gluteal muscles. The dose is increased 2 or 3 cc. with each injection until a maximum of from 10 to 15 cc. is reached.

2. *Diphtheria Antitoxin.*—As used for foreign protein therapy, diphtheria antitoxin is not given for its antitoxic property but because it is an available form of horse serum. The dose is not fixed but is usually from 2 to 4 cc., given intramuscularly. In doses of this size it will usually induce a temperature of from 100 to 101 F.

3. *Vaccines.*—Ordinary stock and autogenous vaccines are given intramuscularly unless sharp thermal reactions are desired. When such is the case, typhoid vaccine is by far the most popular agent and is given intravenously. Ordinary typhoid vaccine is diluted with physiologic solution of sodium chloride to a point at which 1 cc. contains 100 million organisms; the initial dose for adults is from 10 to 25 million. Gonococcus vaccine has also been used intravenously in the treatment of gonorrheal arthritis, and intravenous injections of streptococcus vaccine are now quite popular in the treatment of infectious arthritis.

I have observed that intravenous injections of gram-positive bacteria such as the streptococcus, pneumococcus and staphylococcus are much less likely to cause febrile reactions than the gram-negative organisms such as the gonococcus and typhoid bacillus. The reason for this difference is not clear.

THE NONSPECIFIC REACTION

The reaction to foreign protein injections varies from an almost imperceptible one to extreme shock associated with high fever, profound vasomotor disturbance and other constitutional phenomena. The reaction depends on the substance injected, the dose employed and the method of administration. It also depends a great deal on the physical condition of the patient and the number of previous injections.

Intramuscular injections of protein usually excite comparatively mild reactions. There may be only some local reaction at the point of injection and a constitutional reaction may be entirely absent. Sometimes a so-called focal reaction occurs, that is, a temporary flare-up of acute symptoms in some focus of infection; but this phenomenon is more frequently observed in the febrile reactions. When milk or some of the other proteins are injected intramuscularly in sufficiently large amounts, the local reaction may be supplemented by a mild chill and a rise of temperature of one or two degrees. With this rise in temperature there may be some increase in the leukocytes.

When foreign proteins are given intravenously, the reactions are sharper and make their appearance more promptly. When, for example, typhoid vaccine is given intravenously, the reaction usually occurs in from half an hour to one hour after the injection. At first there is marked chilliness or an actual rigor, with general aching similar to that observed at the onset of any acute infection. As the chill subsides, the temperature of the patient begins to rise. A maximum temperature of 103-105 F. is obtained, usually within two to four hours after the injection. The increase in pulse rate that occurs is in proportion to the fever. Defervescence is usually rapid, though it may be delayed in the first reaction.

In acute infections, such as typhoid or pneumonia, in which a temperature of 102 to 104 F. already exists, the temperature during a protein reaction may sometimes go to 106 or 107 F. For this reason the dose of protein or vaccine should be very carefuly gaged in the treatment of febrile conditions. As a rule, the dosage for febrile patients should be about half that for afebrile individuals.

One of the most interesting phases of the protein reaction is its effect on the leukocytes. Immediately following the injection there is a leukopenia due to the reduction of polymorphonuclear cells. With the onset of the chill a gradually increasing leukocytosis takes place, which reaches its maximum in about six hours and then gradually returns to the previous level. The leukocytosis is of the polymorphonuclear type. In afebrile patients the leukocytosis varies from 13,000 to 15,000 per cubic millimeter, but in acute infectious diseases, such as pneumonia, it may reach from 40,000 to 50,000.

The blood pressure shows a gradual rise during the chill. During the period of perspiration, however, the blood pressure gradually returns to normal.

The Focal Reaction.—The focal reaction ("Herdreaktion" of the Germans) was first described in connection with tuberculosis, in which an injection of tuberculin was followed by exacerbation of symptoms in the original tuberculous focus. With the introduction of foreign protein therapy, focal reactions were noted by many observers. Menzer[10] was the first to observe that tuberculous foci would respond with a typical focal reaction after the injection of streptococcus vaccine. Since this observation was made, numerous investigators have demonstrated the nonspecificity of focal reactions. Almost any inflammatory process, irrespective of etiology, will react to tuberculin as well as to a great variety of other agents. Even an old traumatic injury may be the site of a focal reaction following the intravenous injection of some foreign protein.

MECHANISM OF THE REACTION

The typical thermal reaction of protein fever can be divided roughly into three phases. Immediately after the intravenous injection there is a short prodromal period, which is characterized by first a stage of latency with no symptoms and later a stage of chill. Then the temperature begins to rise. The period from the onset of fever to the point of maximum temperature is referred to as the first, or "negative," phase. The second, or "positive," phase extends from the height of the fever to the return of normal temperature.

Space does not permit of a detailed description of the many physiologic changes that take place in the body during the protein reaction. Hench[11] lists them as follows: 1. Alterations in the basal metabolism. 2. Peripheral and splanchnic vasomotor changes, including alterations in blood pressure and in the caliber and permeability of the arterioles and capillaries. 3. Alterations in renal function, detectable in the output and in the acidity of the urine, excretion of phenolsulphonphthalein, and concentration of nitrogen, phosphate, urea, uric acid, allantoin and albumin. 4. Alterations in serum ferments, antiferments, antibodies and the Wassermann reaction. 5. Alterations in organic activity demonstrated by increased secretion of lymph, bile, saliva, breast milk and menstrual flow and by changes in the activity of the liver, gastro-intestinal tract and spleen. 6. Alterations in the volume, specific gravity, freezing point and viscosity of the blood. 7. Alterations

10. Menzer, A.: Allgemeines und Besonderes über Vakzinetherapie, Med. Klin. **8**: 311, 1912.
11. Hench, P. S.: Usual and Unusual Reactions to Protein (Fever) Therapy, Arch. Int. Med. **49**: 1 (Jan.) 1932.

in the cellular elements of the blood. 8. Alterations in the fragility of the blood platelets and in fibrinogen, thrombokinase, coagulation time and sedimentation rate. 9. Alterations in the chemical constituents of the blood, demonstrated by changes in the carbon dioxide tension of the plasma, carbon dioxide combining power, total nonprotein nitrogen of whole blood and of serum, sugar tolerance, albumin-globulin ratio and concentration of urea, uric acid, sugar, fat, total serum protein and chlorides.

Just which one or more of these physiologic changes are responsible for the beneficial effects that often follow protein injections, it would be hazardous to say. For example, Jobling and Peterson [12] attached great importance to the mobilization of enzymes, particularly proteoses and ipases, following the injection of proteins. Modi [13] in a recent article objects to the term "shock therapy," contending that injections of milk really act as a stimulus to the body. Mueller [14] maintains that in giving protein agents the same activities are affected which are naturally stimulated after bacteria have invaded the body in infections. According to this writer the protein reaction involves a reaction of the entire vegetative nervous system which manifests itself in certain functional changes or organic activities, which are directed into two different channels; first, dilatation and increase of activity in the entire splanchnic area; and, second, contraction of the peripheral vessels and decrease in skin activities and in the functioning of the peripheral organs.

While most writers stress the importance of fever in the protein reaction, Zimmer and Buschmann [15] hold that acute conditions frequently require a fever reaction, while chronic conditions will often be best affected without any fever reaction. Barr, Du Bois and I [16] have found that fever which followed intravenous injection of proteose or typhoid vaccine is accompanied by increased heat production, the amount of which corresponds to the degree of fever. It was found that this increase in heat production followed van't Hoff's law, namely, that with a rise in temperature of 10 degrees C. the velocity of chemical reactions increases between two and three times.

Perhaps the most important function of the foreign protein reaction is the mobilization of immune bodies in the circulating blood. For example, Bieling [17] found that in rabbits immunized against typhoid bacilli there was an increased amount of typhoid agglutinins in the blood following the injection of colon, dysentery or diphtheria bacilli, and these observations have been corroborated by others. Culver [18] noted that in patients with gonorrheal arthritis the intravenous injections of proteoses stimulated antibody formation just as actively as did gonococcus vaccine. Wolff [19] observed that in rabbits the bactericidal power of the blood could be increased by both specific and nonspecific agents. Indeed, it has been shown by numerous authors that any form of fever is conducive to an increase of immune bodies in the circulating blood. Whether this is due to increased formation or to increased mobilization of antibodies it is difficult to say. It has been generally assumed that the beneficial effect of the foreign protein reaction is referable to the fever and that up to a certain point the higher the fever the better the results obtained. There are some, however, who believe that the leukocytosis that accompanies the reaction has important therapeutic value.

12 Jobling, J. W., and Peterson, William: Nonspecific Factors in Treatment of Disease, J. A. M. A. **66**: 1753 (June 3) 1916.

13. Modi, N. J.: Experiments with Milk: Application to Protein Therapy, Arch. internat. de pharmacodyn. et de thérap. **43**: 111, 1932.

14. Mueller, E. F.: Nonspecific Protein Therapy: Its Action and Its Application, Wisconsin M. J. **26**: 287 (June) 1927.

15. Zimmer, A., and Buschmann, P.: Vermeidung und Verhandlung von Schäden die durch Protein-Körper-Therapie hervorgerufen werden, Ztschr. f. ärtzl. Fortbild. **22**: 513, 1925.

16. Barr, D. P.; Cecil, R. L., and Bu Bois, E. F.: Clinical Calorimetry: XXXII. Temperature Regulation After the Intravenous Injection of Proteose and Typhoid Bacillus, Arch. Int. Med. **29**: 608 (May) 1922.

17. Bieling, R.: Untersuchungen über die veränderte Agglutininbildung mit Ruhrbacillen vorbehandelter Kaninchen, Ztschr. f. Immunitätsforsch. u. exper. Therap. **28**: 246, 1919.

18. Culver, H.: Antibodies in Gonococcal Arthritis, J. Lab. & Clin. Med. **3**: 11 (Oct.) 1917.

19. Wolff, L. K.: Ueber unspezifische Therapie, Ztschr. f. d. ges. exper. Med. **67**: 683, 1929.

UNTOWARD REACTIONS

Severe and even fatal reactions sometimes follow the intravenous injection of foreign protein. Such occurrences, however, usually take place in patients who are already seriously ill or who have been greatly overdosed with protein. There have been surprisingly few severe anaphylactic reactions. Among the complications attributed to foreign protein reactions have been delirium tremens, cardiac failure, vascular thromboses, acute nephritis, herpes labialis, rheumatic purpura, acute diarrhea, and activation of old pulmonary tuberculosis. As pointed out by Hench,[11] there are certain reported sequelae of protein treatment, such as appendicitis, cholecystitis, glaucoma, colitis and respiratory infections, for which protein therapy has been deliberately used by the physician with impunity and at times with success. Hench [11] has recently analyzed the reaction to typhoid vaccine, in most cases given intravenously, of 2,500 patients at the Mayo Clinic. Unusual reactions were noted in only fourteen cases. These were acute and subacute appendicitis, cholecystitis, enteritis, pleurisy, pericarditis, iritis, glaucoma, adenitis, vascular thrombosis and renal insufficiency. In this large series, death occurred in only three cases, a mortality rate of 0.12 per cent.

I have seen four fatal reactions from foreign protein therapy. Three of these were in patients with lobar pneumonia who had received intravenous injections of pneumococcus aqueous extract (Huntoon's pneumococcus antibody solution). In two of these cases death was apparently due to vasomotor collapse. In the third case a sustained hyperpyrexia was followed by vasomotor collapse and death. The fourth patient was in an advanced stage of dementia paralytica and after receiving typhoid vaccine intravenously developed a hyperpyrexia, which terminated in circulatory collapse and death. I have never seen a dangerous reaction or any serious complications follow the intravenous use of typhoid vaccine in arthritic or in other patients suffering from some mild infection. On the other hand, at the Mayo Clinic, untoward reactions have been noted more frequently in arthritic and vascular cases than in other conditions, though larger doses of protein have usually been employed in dermatologic and urologic cases than in the former groups.

CLINICAL APPLICATION OF PROTEIN THERAPY

The literature on the clinical application of foreign protein therapy in various diseases is so enormous that in a short review of this kind reference can be made to only a limited number of them.

Typhoid.—Typhoid was the first infectious disease to be treated by foreign protein therapy. Twenty years ago typhoid was still a fairly common disease and at that time a number of excellent studies appeared, report-

ing the results obtained with protein therapy (Gay and Chickering,[20] McWilliams,[21] Fairley,[22] Wiltshire and MacGillycuddy [23] and others). Miller [24] states that the course of the disease is favorably influenced in 60 per cent of the cases. He adds, however, that intramuscular injections are safer than intravenous injections in this disease. Holler [25] used small doses of a 10 per cent solution of deutero-albumose, beginning with two treatments a day and later giving one treatment daily, continuing the injections until the fever was broken. In 1917 he reported 350 cases treated by this method, with a death rate of only 0.5 per cent and an average duration of the disease of only ten days. So far as I can find, Holler's figures are the most impressive that have been reported in the literature.

Pneumonia.—Pneumonia is a disease for which an efficacious serum therapy is available in more than 60 per cent of the cases. There still remains 40 per cent of pneumococcic pneumonias in which some other form of specific or nonspecific treatment would be feasible. In 1922 Larsen and I [26] reported a large series of cases of pneumonia in which Huntoon's antibody solution had been used intravenously in alternate cases. This controlled study offered an opportunity to observe the effect not only of specific but of nonspecific therapy as well, for the antibody solution contained immune bodies against only the three dominant types of pneumococci (types I, II and III). Therefore, when it was administered in the miscellaneous types it became a nonspecific form of therapy. Furthermore, it was nonspecific fever therapy, for each injection of antibody solution was usually followed by a chill and spurt in fever. A series of 110 group IV pneumonias thus treated gave a mortality rate of 16.4 per cent, while 121 untreated group IV cases showed a death rate of 24 per cent.

A similar opportunity occurred when Sutliff and I [27] reported on the effect of Felton's concentrated antipneumococcus serum in the treatment of pneumonia. The nonspecific effect of type I and type II serum could be studied in the miscellaneous group of pneumonias, this time without febrile reactions. Of 142 group IV patients who received type I-type II serum the death rate was 28.2 per cent. Of 133 group IV patients who received none, the death rate was 38.3 per cent.

Miller [28] treated fifteen cases of lobar pneumonia during the first two days of the disease with a single intravenous injection of typhoid vaccine. In six of the fifteen the pulse, temperature and respiration returned to normal a few hours after the reaction, but this improvement was temporary in three of the six. Three patients were permanently detoxicated and underwent rapid convalescence. Favorable results with typhoid vaccine have also been reported by Cowie and Beaven [29] and by Wells.[30]

It is obvious that in an infection of such comparatively short duration as pneumonia the interpretation of protein therapy would be difficult unless the injections were given very early in the disease. Furthermore, in spite of the statistical evidence in favor of protein fever therapy in pneumonia I feel that it is too drastic a form of treatment for routine use in such a severe infection as pneumonia. The fatal reactions mentioned earlier in this article support such a view.

Sepsis.—The chills and temperature reactions of a patient with sepsis bear a strong resemblance to those which follow intravenous injections of foreign protein. A number of writers have reported favorable results from this method of treatment. For example, Wilmette [31] reported a series of cases of puerperal sepsis with good results, some terminating by crisis. Lüdke [32] treated five cases with three rapid recoveries.

Syphilis.—In the earlier days of protein therapy a number of investigators found it quite valuable in the treatment of the cutaneous manifestations of syphilis. With the development, however, of arsphenamine and heavy metal therapy, protein treatment has yielded to a more specific form of medication.

Protein therapy has maintained its prestige, however, in the treatment of dementia paralytica and to a less extent in tabes dorsalis. The outstanding advocate of foreign protein therapy in dementia paralytica has been Wagner-Jauregg.[33] The brilliant results obtained in this disease with typhoid vaccine and malarial therapy is indeed amazing when one considers how comparatively little benefit was gained from ordinary treatment of this condition with mercury and the iodides. As early as 1911, Pilcz [34] reported excellent results with tuberculin in the treatment of dementia paralytica. In 1917 malaria was first used therapeutically by Wagner-Juaregg,[35] who employed it in the treatment of dementia paralytica. This investigator had previously tried tuberculin and typhoid vaccine in the treatment of dementia paralytica and had obtained very good results following the febrile reactions produced by these agents. In 1928 his co-worker Gerstmann [36] summarized the results obtained with 2,000 patients in Wagner-Jauregg's clinic, and in 1931 Wagner-Jauregg [37] reported the results in 3,000 cases treated in the Vienna Psychiatric Clinic. The results reported by Wagner-Jauregg and by Gerstmann were most impressive and have been widely corroborated by other investigators in Germany, Great Britain and America. Wagner-Jauregg was convinced that malarial therapy was much superior to other agents for the production of thermal reactions, and this view is now quite widely held by neurologists. There are some, however, who believe that frequent injections of typhoid vaccine are just as efficacious, and certainly typhoid vac-

20. Gay, F. P., and Chickering, H. T.: Treatment of Typhoid Fever by Intravenous Injections of Polyvalent Sensitized Typhoid Vaccine Sediment, Arch. Int. Med. **17:** 303 (Feb.) 1916.

21. McWilliams, H. I.: Is the Hyperleukocytosis Following the Injection of Typhoid Bacilli into Immunized Rabbits Specific? J. Immunol. **1:** 159 (April) 1916.

22. Fairley, K. D.: The Treatment of Typhoid Fever by Intravenous Vaccines, M. J. Australia **2:** 291 (Sept. 22) 1923; A Preliminary Report on the Treatment of Typhoid Fever with Intravenous Vaccines, ibid. **2:** 428 (Nov. 12) 1921.

23. Wiltshire, H. W., and MacGillycuddy, A. R. N.: Treatment of Typhoid Fever by Typhoid Vaccine, Lancet **11:** 685, 1915.

24. Miller, J. L.: Nonspecific Therapy, Medicine **6:** 513 (Dec.) 1927.

25. Holler, G.: Beobachtungen über die Wirkungsweise parenteral einverleibter Proteinkörper zu therapeutischen Zwecken bei Infectionskrankheiten, Med. Klin. **13:** 1038, 1917.

26. Cecil, R. L., and Larsen, N. P.: Clinical and Bacteriologic Study of One Thousand Cases of Lobar Pneumonia, J. A. M. A. **79:** 343 (July 29) 1922.

27. Cecil, R. L., and Sutliff, W. D.: The Treatment of Lobar Pneumonia with Concentrated Antipneumococcus Serum, J. A. M. A. **91:** 2035 (Dec. 29) 1928.

28. Miller, J. L.: The Effect of Foreign Protein Therapy in Lobar Pneumonia, J. A. M. A. **74:** 1598 (June 5) 1920.

29. Cowie, D. M., and Beaven, P. W.: Nonspecific Protein Therapy in Influenzal Pneumonia, J. A. M. A. **72:** 1117 (April 19) 1919.

30. Wells, C. W.: Intravenous Injections of Foreign Protein in Influenzal Pneumonia, J. A. M. A. **72:** 1813 (June 21) 1919.

31. Wilmette, R. G.: Injections intraveineuses de métaux colloidaux: Traitement de l'infection puerperale, J. méd. de Paris **35:** 117, 1916.

32. Lüdke, H.: Ueber Tetragenussepsis, München med. Wchnschr. **67:** 454 (April 16) 1920.

33. Wagner-Jauregg, Julius: Ueber die Einwirkung fieberhafter Erkrankungen auf Psychosen, Jahrb. f. Psychiat. u. Neurol. **7:** 94, 1887.

34. Pilcz, A.: Weiterer Bericht über die Tuberkulinbehandlung der progressiven Paralyse, Wien. med. Wchnschr. **62:** 2010 and 2083, 1912.

35. Wagner-Jauregg, Julius: Ueber die Einwirkung der Malaria auf die progressive Paralyse, Psychiat.-neurol. Wchnschr. **20:** 132 and 251, 1918-1919.

36. Gerstmann, J.: Die Malariabehandlung der progressiven Paralyse, Vienna, Julius Springer, 1928.

37. Wagner-Jauregg, Julius: Verhütung und Behandlung der progressiven Paralyse durch Impfmalaria, Handbuch der experimentellen Therapie, Serum- und Chemotherapie (Ergänzungsband), 1931, p. 183.

cine has practical advantages over malaria. Mackenzie,[38] for example, has obtained excellent results with typhoid vaccine and stresses the absence of the cachexia and anemia that so often follow malaria. Kunde, Hall and Gerty [39] are enthusiastic over typhoid vaccine therapy in dementia paralytica, and favorable reports have recently been published by Jennings [40] and by Young and Bennett.[41]

Both relapsing fever and rat-bite fever have been used therapeutically in dementia paralytica.[42] The results with relapsing fever as reported by Plaut and Steiner [43] and more recently by Signorelli [44] seem to be about as good as those obtained by others with malaria; this is still further evidence that it is the febrile reaction and not the agent which produced the fever which is the essential part of the treatment.

The results of foreign protein therapy in tabes have not been so brilliant as those obtained in dementia paralytica, though Wagner-Jauregg reports that the lightning pains of gastric crises are often relieved by this treatment.

Other Nervous Diseases.—In 1924 Grosz [45] reported very favorably on the treatment of multiple sclerosis with foreign protein therapy. Twenty-nine patients were treated with typhoid vaccine and forty-two with malaria. In both series something more than 25 per cent showed marked improvement. Other writers, notably Dreyfus and Hanau [46] and Schacherl, [47] have also reported good results in this disease. According to Dannhauser [48] and Leiner,[49] encephalitis and postencephalitic syndromes are favorably affected by protein therapy. Schmidt [50] recommends nonspecific therapy for dementia praecox, and Sutton [51] has obtained remarkably good results in chorea with frequent intravenous injections of typhoid vaccine.

The unbiased reader cannot fail to be impressed by the enthusiasm of these writers. However, one should remember that the nervous diseases discussed are all characterized by alternating periods of improvement and relapse; so while one can expect striking improvement in many such cases after fever therapy, the possibility or even probability of a recurrence must always be borne in mind.

Acute and Chronic Arthritis.—In the field of arthritis foreign protein therapy has achieved considerable success, and probably more articles have been written on the use of protein therapy in the treatment of various rheumatic conditions than on any other subject. According to Miller [52] 50 per cent of patients with acute arthritis are free from discomfort after from two to three intravenous injections of typhoid vaccine, and in about 25 per cent of these the relief is permanent.

A number of years ago I [53] tried intravenous injection of typhoid vaccine on forty cases of acute arthritis, including a number of cases of rheumatic fever and gonococcic arthritis, and found that 32 per cent made a rapid and complete recovery without recourse to any other treatment, while of the remaining cases all but two showed improvement. The results in the seven cases of gonococcic arthritis were only fairly good. In my opinion foreign protein therapy should always be considered in the treatment of acute arthritis, especially for those cases in which salicylates have failed to give good results.

In chronic arthritis of the rheumatoid type, foreign protein therapy has not proved so satisfactory as in the acute form, though the immediate effects are sometimes quite striking. The swelling of the joints is diminished and the pain is decreased. In the majority of cases, however, relapse occurs sometimes in a few days, sometimes after several weeks or months of comparative freedom from pain. The literature on this subject is so extensive that only a few representative articles can be referred to. Laurie [54] obtained good results in rheumatoid arthritis by first giving a series of injections of colon bacillus vaccine intravenously in the hospital, then having the patient return once a week for additional injections. Löwenstein [55] gave intravenous injections of casein and found them helpful. Snyder and Ramirez [56] obtained "cures" in only six of their series of 70 cases, and these were all of less than two years' duration. Of the remaining cases, half showed definite improvement in the upper extremities, but in only one fourth was a similar relief obtained in the lower extremities. Miller,[52] after a wide experience with typhoid vaccine in the treatment of chronic arthritis, states that, in the early stages of rheumatoid arthritis in which there is evidence of marked inflammation, fever therapy will occasionally give gratifying results, terminating the disease sometimes permanently, more frequently for a few months, after which it again becomes active but often yields to a second course of treatment. Campbell [57] treated seventy cases with typhoid vaccine and noted improvement in fifty-eight, though sixteen of these relapsed. In summing up he remarks: "Protein shock is not and cannot be regarded as an ideal method of treatment, yet I am of the view that in the present state of our knowledge of rheumatoid arthritis, it offers greater possibility of success than any other treatment."

I have used typhoid vaccine with success in early cases of rheumatoid arthritis; [58] many such patients remain well. It is particularly useful in the febrile type of case. In chronic, well established cases I prefer small intravenous doses of streptococcus vaccine, too small to excite a febrile reaction. This is not a brilliant form of

38. Mackenzie, J. M.: Pyrexia Induced by Intravenous Protein Therapy in General Paralyses, Lancet **2:** 223 (July 30) 1927.
39. Kunde, M. M.; Hall, G. W., and Gerty, F. J.: Nonspecific Protein Therapy in General Paralysis: A Preliminary Report, J. A. M. A. **87:** 1376 (Oct. 23) 1926.
40. Jennings, W. B.: Foreign Protein Intravenously in General Paralysis, M. J. & Rec. **125:** 799 (June 15) 1927.
41. Young, G. A., and Bennett, A. E.: Nonspecific Protein (Typhoid Vaccine) Therapy of Disseminated Sclerosis: Preliminary Report of Results in Eight Cases, Nebraska M. J. **12:** 401 (Nov.) 1927.
42. Solomon, H. C.; Berk, A.; Theiler, M., and Clay, C. L.: The Use of Sodoku in the Treatment of General Paralysis: A Preliminary Report, Arch. Int. Med. **38:** 391 (Sept.) 1926.
43. Plaut, F., and Steiner, G.: Die Recurrenstherapie der syphilogenen Nervenkrankheiten, Ztschr. f. d. ges. Neurol. u. Psychiat. **94:** 153, 1924.
44. Signorelli, E.: Malaria e ricorrente terapia, Riv. di clin. med. **28:** 705 (Sept. 30) 1927.
45. Grosz, K.: Malariabehandlung der multiplen Sklerose, Jahrb. f. Psychiat. u. Neurol. **43:** 198, 1924.
46. Dreyfus, G. L., and Hanau, R.: Grundsaetzliches über die Verwendung des neuen Fiebermittels Saprovitan in der Neurologie, Deutsche med. Wchnschr. **52:** 1381 (Aug. 13) 1926.
47. Schacherl, M.: Treatment of Multiple Sclerosis, Wien. klin. Wchnschr. **37:** 1037 (Oct. 2) 1924.
48. Dannhauser, A.: Protein Therapy in Neurology, München. med. Wchnschr. **71:** 742 (June 6) 1924.
49. Leiner, J. H.: Spontaneous Cure of Case of Epidemic (Lethargic) Encephalitis Following Attack of Pneumonia, J. A. M. A. **81:** 1284 (Oct. 13) 1923.
50. Schmidt, R.: Ueber das Problem der Proteinkörpertherapie, Med. Klin. **2:** 695 (July 4) 1920.
51. Sutton, Lucy P.: The Treatment of Chorea by the Induction of Fever, J. A. M. A. **97:** 299 (Aug. 1) 1931.
52. Miller, J. L.: The Present Status of Nonspecific Therapy, J. A. M. A. **95:** 464 (Aug. 16) 1930.
53. Cecil, R. L.: A Report on Forty Cases of Acute Arthritis Treated by the Intravenous Injection of Foreign Protein, Arch. Int. Med. **22:** 951 (Dec.) 1917.
54. Laurie, H.: Intravenous Therapy of Rheumatoid Arthritis, M. J. Australia **1:** 309 (March 24) 1923.
55. Löwenstein, W.: Bemerkungen zur Proteintherapie chronisch-rheumatischer Erkrankungen, Fortschr. d. Therap. **3:** 816 (Dec. 10) 1927.
56. Snyder, R. G., and Ramirez, M. A.: Intravenous Use of Foreign Protein in the Treatment of Chronic Cases of Arthritis, with Special Reference to the Use of Secondary Proteose, Arch. Int. Med. **28:** 50 (July) 1921.
57. Campbell, A. D.: Nonspecific Therapy in Rheumatoid Arthritis, Glasgow M. J. **103:** 79 (Jan.) 1925.
58. Cecil, R. L.: The Medical Treatment of Chronic Arthritis, J. A. M. A. **103:** 1583 (Nov. 24) 1934. Cecil.[53]

therapy, but, if the injections are continued for several months, many patients make improvement under it. The injections are given every four or five days, in doses that range from 50,000 bacteria to a final dosage of perhaps fifty or a hundred million.

Diseases of the Skin.—In dermatology, foreign protein therapy has been widely used, and with considerable success, in certain inflammatory conditions, such as furunculosis, carbuncle and other staphylococcic infections of the skin, and to a less extent in ringworm, lupus, pruritus and the like. Sometimes a persistent form of urticaria will yield promptly to boiled milk or to some form of bacterial vaccine. Especially good results have been claimed for colon bacillus vaccine in urticaria. Favorable results have been reported in psoriasis, but in my experience the benefit obtained in this disease has been very short lived. O'Leary [59] has found foreign protein most beneficial in the treatment of anthrax and erysipelas. Less favorable results were obtained in staphylococcic infections of the skin. He saw no benefit whatever from the use of nonspecific therapy in eczema or in allergic dermatitis. Schmidt [50] reports excellent results with milk therapy in erysipelas. For further data on protein treatment in dermatology the reader is referred to papers by Hall,[60] Weirauk [61] and Low.[62]

Diseases of the Eye.—Nonspecific therapy in the form of boiled milk or typhoid vaccine has been employed extensively in iritis, uveitis, keratitis, conjunctivitis and other inflammatory conditions of the eye. There seems to be some disagreement as to the benefit to be derived from protein therapy in trachoma. Friedlander [63] and Howard [64] both report good results in this condition, but other writers, such as Steindorff,[65] are not so enthusiastic. Miller [24] states that there is no acute infection in which the results of foreign protein therapy are so good as in acute iritis. According to this writer the results are immediate and the relief permanent, and this opinion is corroborated from many sources. Key [66] produced experimental ulcers on the cornea of rabbits and obtained prompt relief with diphtheria antitoxin.

Scarlett [67] found horse serum just as satisfactory as diphtheria antitoxin. He considers protein therapy a "valuable adjunct" in the treatment of ocular infections, but always in conjunction with regular routine treatment. A. C. Woods [68] believes nonspecific protein therapy one of the most valuable of weapons in certain ophthalmologic conditions but warns that it is "specialized therapy" and that age, duration of disease and condition of the patient must all be considered in every case. Benedict [69] found that, in eye work, shifting from one form of protein therapy to another often proved to be more effective than continuing with the same form. If space permitted, many other enthusiastic reports could be cited, such as those of Allen,[70] Verhoeff [71] and Gaston.[72]

Gynecology.—In pelvic disease the most important field of protein therapy has been in adnexal infections of an acute or subacute type. In such conditions the results of protein therapy have often been quite striking. The consensus seems to be, however, that its chief function is in the relief of pain and extreme tenderness. There is considerable doubt as to just how often a tubal infection is "cured" by protein therapy. Gellhorn [73] is enthusiastic over injections of milk for such infections, particularly gonorrheal infection of the tubes and Bartholin's glands. Chiaudano [74] employed milk, but he is not so enthusiastic, nor is Kauert,[75] who employed "aolan," a milk derivative. Other writers, however, notably Rawls,[76] Mohler,[77] Llewellyn,[78] Jarcho,[79] Champlin [80] and Hibbert,[81] used either milk or aolan with excellent effect.

L. H. Stuhler [82] of the Mayo Clinic has found foreign protein therapy a good measure in pelvic cellulitis and in acute as well as chronic salpingitis. In his experience it is especially adapted to those early cases in which pus formation has not yet started. He considers protein therapy of value even in the well advanced cases, and in his opinion it is the method of choice in cases in which surgery is not yet indicated or is contraindicated. Stuhler believes that protein therapy has saved a great many patients from major surgical operations. This writer goes so far as to say that if he were limited to one method of treatment in salpingitis he would choose foreign protein therapy without hesitation.

Genito-Urinary Infections.—Gonorrhea and its complications have been treated by various forms of nonspecific therapy as well as by gonococcus vaccine. Particularly good results have been reported in epididymitis and in gonococcic arthritis. Antoni [83] and Müller [84] have noted remarkable results from milk therapy in buboes.

For gonococcic infections, however, fever therapy is now more successfully used in the form of diathermy or the "short wave" than by typhoid or gonococcus vaccine. The subject of fever therapy in gonococcic infections is well reviewed in a recent article by Desjardins, Stuhler and Popp.[85]

Peptic Ulcer.—One would hardly expect protein therapy to have any value in the treatment of peptic

59. O'Leary, P. A.: Present Status of Nonspecific Treatment in Dermatology, Arch. Dermat. & Syph. **15:** 470 (April) 1927.
60. Hall, E. R.: Nonspecific Protein Therapy in Dermatology, South. M. J. **19:** 731 (Oct.) 1926.
61. Weirauk, H. V.: Nonspecific Protein Therapy, Milk, in the Treatment of Certain Diseases of the Skin and Syphilis, Ohio State M. J. **22:** 305 (April) 1926.
62. Low, R. C.: Uses of Nonspecific Therapy, Brit. M. J. **2:** 577 (Sept. 24) 1932.
63. Friedlander, W.: Therapeutische Erfahrungen bei parenteraler Injektion von Proteinkörpern und ihren Spaltprodukten in der Augenheilkunde, Wien. klin. Wchnschr. **29:** 1329, 1916.
64. Howard, H. J.: Nonspecific Protein Therapy in Eye Inflammations, with Special Reference to the Use of Typhoid Vaccine, China M. J. **41:** 395 (May) 1927.
65. Steindorff, R.: Nonspecific Protein Therapy in Eye Diseases, Deutsche med. Wchnschr. **53:** 744 (April 29) 1927.
66. Key, B. W.: Antidiphtheric Serum in Ocular Infection, J. A. M. A. **82:** 183 (Jan. 19) 1924.
67. Scarlett, H. W.: Clinical and Experimental Observations on Foreign Protein, Especially in Iritis, Am. J. Ophth. **10:** 747 (Oct.) 1927.
68. Woods, A. C.: Protein Therapy; Specific and Nonspecific in Ophthalmology, Ohio State M. J. **23:** 740 (Sept.) 1927.
69. Benedict, W. L.: Protein Therapy in Ophthalmology, Minnesota Med. **11:** 203 (April) 1928.
70. Allen, T. D.: Typhoid Vaccine in Ophthalmology, Tr. Sect. Ophth., A. M. A., 1925, p. 135.
71. Verhoeff, F. H.: Effective Treatment for Sympathetic Uveitis, Arch. Ophth. **56:** 28 (Jan.) 1927.
72. Gaston, I. E.: Milk Injections in Ophthalmic Cases, Am. J. Ophth. **9:** 111 (Feb.) 1926.
73. Gellhorn, George: Milk Injections in Gynecology and Obstetrics, J. Indiana M. A. **19:** 229 (June) 1926.
74. Chiaudano, C.: Parenteral Injections of Milk in Surgical Diseases, Policlinico (sez. chir.) **28:** 50 (Feb.) 1921.
75. Kauert, F.: Ueber Proteinkörpertherapie bei Adnexerkrankungen, München. med. Wchnschr. **66:** 1033, 1919.
76. Rawls, R. M.: Protein (Milk) Injections in Gynecological Infections, New York State J. Med. **25:** 1108 (Dec. 15) 1925.
77. Mohler, R. W.: Foreign Proteins as Adjuvants in the Treatment of Obstinate Pelvic Infections, Am. J. Obst. & Gynec. **9:** 365 (March) 1925.
78. Llewellyn, T. H.: Protein Therapy for Pelvic Infection, S. Clin. North America **6:** 122 (Feb.) 1926.
79. Jarcho, J.: Nonspecific Protein Therapy in Pelvic Infections, M. J. & Rec. **123:** 237 (Feb. 17) 1926.
80. Champlin, J., Jr.: The Use of Milk Injection in Pelvic Inflammation, Boston M. & S. J. **194:** 1029 (June 3) 1926.
81. Hibbert, G. F.: Protein Therapy in Gynecology, Am. J. Obst. & Gynec. **17:** 227 (Feb.) 1929.
82. Stuhler, L. H.: Personal communication to the author.
83. Antoni: Die Aolanbehandlung der weichen Schankers und entzündlicher Bubonen, München. med. Wchnschr. **66:** 746, 1919.
84. Müller, R.: Die Behandlung des venerischen Bubo mit Milchinjektion, Wien. klin. Wchnschr. **32:** 780, 1919.
85. Desjardins, W. U.; Stuhler, L. G., and Popp., W. C.: Fever Therapy for Gonococcic Infections, J. A. M. A. **104:** 873 (March 16) 1935.

ulcer. Pribram,[86] however, has reported a large series of ulcers treated by intravenous injections of a vegetable albumin (novoprotein) and states that the pain was much relieved in from 50 to 60 per cent of the cases. He even goes so far as to assert that roentgen observations indicate healing of the ulcer. Treatments were given at intervals of from two to four days, the patient receiving a total of eight or ten injections. Martin,[87] Mueller,[88] Miller [24] and others have confirmed Pribram's results, at least so far as relief of gastric pain is concerned. Miller found that immediate effect of typhoid vaccine on ulcers was very good and stresses the alleviation of pain. A certain number of his cases, however, relapsed shortly after the treatment. In view of the marked tendency of ulcers to periodic remissions and exacerbations, the results of protein therapy in such conditions must be accepted with considerable reservation.

Vascular Disease.—One of the newer fields for foreign protein therapy is that of vascular disease, particularly thrombo-angiitis obliterans. In vascular disease, however, it is probably the vasodilatation rather than the fever, leukocytosis or mobilization of immune bodies that is responsible for the beneficial effect obtained. According to Wright,[89] the desired physiologic effect of fever therapy in vascular disease is release of spasm of the partially occluded vessels with resulting increase in the local capillary circulation. This is followed by cessation of pain and healing of ulcerations, if they exist.

The pain in thrombo-angiitis obliterans is often excruciating, and Brown [90] considers the intravenous administration of typhoid vaccine the best medical measure for its relief. Allen and Smithwick [91] have reported successful results with typhoid vaccine in Buerger's disease, in the gangrene of arteriosclerosis, and in purely vasomotor types of vascular occlusion. These authors used doses of from 125 to 300 million bacilli, but Wright believes that the chill should be avoided and recommends small doses, just enough to produce 2 or 3 degrees of fever. Wright recommends an initial dose of 10 million typhoid bacilli, with an increase of 10 million with each subsequent injection.

Goodman and Gottesman [92] have also reported enthusiastically on the use of fever therapy in vascular disease, particularly Raynaud's disease. They say: "Our most satisfactory results were obtained in the three cases of Raynaud's disease that we treated with foreign protein. Immediate and lasting improvement resulted in each case. No other treatment was employed."

It would appear from this brief survey that protein therapy has found one of its most important uses in vascular disease. The danger of thrombosis as a complication of the treatment must be kept in mind. It is for this reason that Wright warns against inducing chills in these patients and advises small doses of protein that will produce fever without the preceding rigor. Barker [93] of the Mayo Clinic has recently reported favorable results in peripheral vascular disease with typhoid H antigen. This antigen is a derivative of the typhoid bacillus and when injected intravenously produces fever but definitely less chill than the ordinary typhoid vaccine. In view of the absence or diminution of the chill, Barker believes that it is a better product for vascular disease than the usual typhoid vaccine.

Allergic Diseases.—In 1909 Biedl and Kraus [94] found that an animal sensitized to a foreign protein could be partially desensitized with peptone, and this work has been confirmed by other investigators. No doubt this explains the beneficial effects sometimes obtained by protein therapy in such conditions as asthma, hay fever and urticaria. Rackemann [95] has pointed out that bacterial vaccines in asthma are beneficial in proportion to their power to produce a local reaction at the site of injection. I once saw an accidental local infection in the arm of an asthmatic patient at the site of a vaccine injection. The improvement that ensued from this local infection was much more marked than that which the patient received from any subsequent vaccine injections. Van Leeuwen [96] has used tuberculin in the treatment of asthma and reports 300 cases treated by this method with 50 per cent completely or almost completely cured and from 25 to 30 per cent improved.

As Miller [24] remarks, however, it is difficult to explain the permanent cures reported by various writers on asthma, for it is generally recognized that desensitization is a more or less temporary state.

CONTRAINDICATIONS

The more important contraindications to intravenous foreign protein therapy are:

1. Advanced arterial, renal or cardiac disease. Patients with cardiac decompensation should not have intravenous protein therapy. On the other hand, rheumatic endocarditis with good compensation is not a contraindication.
2. Allergic states or conditions of marked protein sensitivity, such as angioneurotic edema, giant urticaria and the like.
3. States of extreme exhaustion following prolonged illness.
4. Pulmonary tuberculosis, active or quiescent.
5. Hemorrhagic conditions, such as hemophilia, bleeding ulcers and the like.
6. Chronic alcoholism, for fear of delirium tremens.
7. Marked nervous sensibility, such as that seen in hyperthyroidism and the like.

The contraindications for subcutaneous or intramuscular injections of protein are much less stringent than for the intravenous injections. Indeed, there are very few patients who cannot take with impunity small doses of bacterial vaccine, boiled milk or serum subcutaneously.

There has been considerable difference of opinion concerning the danger of protein therapy in patients with pulmonary tuberculosis. A number of writers have reported pulmonary focal reactions in tuberculous patients after injections of protein. Hektoen and Irons [97] cite five cases of latent pulmonary tuberculosis activated by the use of stock vaccines. I recall one case

86. Pribram, B. O.: Proteintherapie und chirurgische Therapie des Magen- und Duodenalgeschwürs, Deutsche med. Wchnschr. **51**: 141 (Jan. 23) 1925.
87. Martin, Lay: Peptic Ulcer: Effect of Parenteral Injections of Purified Milk Proteins on Symptoms and Progress, Arch. Int. Med. **43**: 299 (March) 1929.
88. Mueller, E. F.: Nonspecific Protein Therapy: Its Action and Its Application, Wisconsin M. J. **26**: 287 (June) 1927.
89. Wright, I. S.: The Modern Medical Treatment of Diseases of the Peripheral Vascular System, M. Clin. North America **17**: 1429 (March) 1934.
90. Brown, G. E.: Treatment of Peripheral Vascular Disturbances of the Extremities, J. A. M. A. **87**: 379 (Aug. 7) 1926.
91. Allen, A. W., and Smithwick, R. H.: Use of Foreign Protein in the Treatment of Peripheral Vascular Diseases, J. A. M. A. **91**: 1161 (Oct. 20) 1928.
92. Goodman, C., and Gottesman, J.: Pain and Its Treatment in Thrombo-Angiitis Obliterans, New York M. J. **117**: 774 (June 20) 1923.
93. Barker, N. W.: Typhoid H Antigen; Further Observations on Nonspecific Foreign Protein Therapy in Peripheral Vascular Disease, Proc. Staff Meet., Mayo Clin. **5**: 267 (Sept. 24) 1930.
94. Biedl, A., and Kraus, R.: Experimentelle Studien über Anaphylaxie, Wien. klin. Wchnschr. **22**: 363, 1909.
95. Rackemann, F. M., and Graham, L. B.: The Vaccine Treatment of Asthma, J. Immunol. **8**: 295 (July) 1923.
96. Storm Van Leeuwen, W.: Allergic Diseases, Philadelphia, J. B. Lippincott Company, 1925.
97. Hektoen, Ludvig, and Irons, E. E.: Vaccine Therapy, J. A. M. A. **92**: 864 (March 16) 1929.

of spondylitis in a young man who was treated in the New York Hospital with typhoid vaccine intravenously and who developed active pulmonary tuberculosis a short time after leaving the hospital. On the other hand, Brown, Heise, Petroff and Wilson [98] noted focal activation in only two of 124 tuberculous patients who received typhoid vaccine subcutaneously for prophylactic purposes.

COMMENT

One of the most difficult problems in modern medicine is the proper evaluation of new therapeutic measures that cannot be tested accurately either by animal experimentation or by carefully controlled statistical studies on patients but which rest for their acceptance entirely on an empirical basis. Foreign protein therapy is an excellent example of such a form of treatment. Animals have been used for studying the physiologic effect of proteins, but with the exception of Key's studies on experimental iritis in rabbits there has been very little effort to test the value of foreign protein experimentally. Numerous statistical studies on foreign protein therapy have been reported, but most of them have been uncontrolled—an omission that perhaps is pardonable in the study of chronic infections, in which controls are always difficult of interpretation.

Whatever popularity foreign protein therapy has received rests largely on an empirical basis. The earliest reports were clinical studies on patients. Experimental work came later. These facts, however, should not raise prejudice against protein treatment, provided the clinical reports can be relied on. Physicians have always been compelled by force of necessity to make use of empirical remedies in the treatment of disease and will probably continue to do so for many years to come.

What then should be the place of foreign protein therapy in modern practice? This question can be answered readily enough with respect to subcutaneous and intramuscular injections of vaccines or proteins such as milk, peptone and the like, which produce little or no reaction in the patient when given in reasonable doses. As a rule these injections do no harm, but often they fail to do any good. The benefit to be derived from protein therapy often seems to be in proportion to the amount of constitutional reaction and fever produced. Such being the case, the physician will in many cases be tempted to resort to intravenous protein therapy with some fever-producing substance like typhoid vaccine, and what every practitioner would like to know is just when he is justified in using this rather drastic form of treatment. He has in mind the question once propounded by Theobald Smith: How much energy does a reaction of this sort cost the patient, and is the final result worth the cost?

I am disposed to agree with Miller [24] that typhoid vaccine, when given in proper doses and to carefully selected patients, is not a dangerous form of therapy. In the case of intravenous therapy, the most important precautions are: to (1) make the first dose a small one and (2) not to try protein therapy on patients who are in an extreme state of exhaustion. The indications and contraindications for this method of treatment have already been discussed. Experience with any form of therapy is a valuable asset to the practitioner, especially when an element of risk enters into its application. Protein therapy falls into this category, but any well trained physician should be qualified to practice it, provided he will take the necessary precautions. I much prefer to administer fever therapy in a hospital. It can be undertaken in the patient's home if a nurse is in attendance, but the hospital is much to be preferred. Under no conditions should fever therapy be undertaken in the doctor's office. There is too much danger of a chill on the way home.

I believe that foreign protein therapy will always find its greatest usefulness in acute and subacute infections. The glowing reports by some writers on the achievements of protein therapy in various chronic diseases have not been widely corroborated. It is significant that many of these rather startling claims have been made with regard to certain chronic infections such as peptic ulcer, multiple sclerosis and chronic arthritis, which are characterized by periodic remissions and exacerbations.

A great many proprietary remedies have been offered to the medical profession as substitutes for milk, serum and ordinary bacterial vaccines. In many cases special claims have been made for these products, in language that is often mystifying, to say the least. As an example, I quote the following from an editorial in THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION [99] concerning the claims made for "Proto-Enzyme for the Involvements in Gonorrhea": "The nonspecific proteins contained are claimed to stimulate the production of phagocytes which 'attack and ingest the starved gonococci, changing them into peptones and releasing these peptones osmotically into the blood stream,' where they are taken up by red blood corpuscles . . . carried . . . to the liver, where they are split by the hepatic hormones into fatty acids and urates, and . . . easily eliminated by the emunctories.'" It is doubtful whether the man who wrote these words knew what they meant; certainly they mean nothing to a physician who knows his physiology. Furthermore, it is extremely unlikely that these commercial products possess any virtues which are not equally inherent in typhoid vaccine, or the other agents commonly employed for nonspecific therapy.

Finally, as remarked by Hench,[100] foreign protein therapy may prove to be more "specific" than "nonspecific." Foreign protein produces a great many different kinds of specific reactions in the body. It is already being found that some of these reactions are helpful in one disease, while others are helpful in another. For example, in the treatment of peptic ulcer the specific effect desired is to keep the gastric acidity low. In dementia paralytica the fever is presumed to be the desirable part of the reaction. In vascular disease we are concerned exclusively with the degree of vasomotor dilatation produced. In certain other infections it may be the leukocytosis or the mobilization of the specific immune bodies that produces the beneficial result. The future study of foreign protein therapy will no doubt bring to light many new facts which will eventually take this procedure out of the realm of "nonspecific" into that of "specific" treatment, and it is quite possible that, while for the moment foreign protein therapy may seem to have lost some of its prestige and popularity, we may be on the verge of information that will result in a renewed and more skilful application of this method in the treatment of disease.

98. Brown, L.; Heise, F. H.; Petroff, S. A., and Wilson, G. E.: A Study of the Effects of Typhoid Fever and Antityphoid Immunization on Pulmonary Tuberculosis, Am. Rev. Tuberc. **2**: 717 (Feb.) 1919.

99. The Horovitz Proteins and Lipoids Again, editorial J. A. M. A. **93**: 1975 (Dec. 21) 1929.

100. Hench, P. S.: Personal communication to the author.

CONCLUSION

It may be said that protein therapy, after twenty years of investigation and clinical trial, rests on a sound foundation and has now achieved a permanent though limited place for itself in modern therapeutics. In the realm of infectious diseases it has met with general acceptance in the treatment of: (1) infections of the eye, (2) acute and subacute pelvic infections, (3) certain infections of the skin, (4) a few generalized infections, such as sepsis and typhoid, (5) acute and chronic forms of infectious arthritis, and (6) cerebrospinal syphilis, especially dementia paralytica.

In the field of vascular disease, notably in thromboangiitis obliterans, foreign protein therapy also appears to have earned a secure therapeutic position.

33 East Sixty-First Street.

Committee on Foods

ACCEPTED FOODS

THE FOLLOWING PRODUCTS HAVE BEEN ACCEPTED BY THE COMMITTEE ON FOODS OF THE AMERICAN MEDICAL ASSOCIATION FOLLOWING ANY NECESSARY CORRECTIONS OF THE LABELS AND ADVERTISING TO CONFORM TO THE RULES AND REGULATIONS. THESE PRODUCTS ARE APPROVED FOR ADVERTISING IN THE PUBLICATIONS OF THE AMERICAN MEDICAL ASSOCIATION, AND FOR GENERAL PROMULGATION TO THE PUBLIC. THEY WILL BE INCLUDED IN THE BOOK OF ACCEPTED FOODS TO BE PUBLISHED BY THE AMERICAN MEDICAL ASSOCIATION.

RAYMOND HERTWIG, Secretary.

KRIM-KO CHOCOLATE FLAVORED DRINK

Bottlers and Distributors.—

The Allegan Dairy, Allegan, Mich.
Bareman Brothers Dairy, Holland, Mich.
Bell Ice Cream Company, Lubbock, Texas.
Bruder Dairy Products, Cleveland.
Cannon Dairy, Dade City, Fla.
Coss Dairy, Dixon, Ill.
Gascoyne Dairy, Lockport, N. Y.
Golden Rod Dairy, Clearfield, Pa.
Grand Haven Sanitary Dairy, Grand Haven, Mich.
Janesville Pure Milk Co., Inc., Janesville, Wis.
Jo-Mar Dairies Company, Salina, Kan.
Midwest Creamery Company, Stillwater and Ponca City, Okla.
Montgomery Dairy, Inc., Montgomery, W. Va.
Mount Vernon Dairy, Charleston, W. Va.
Pet Dairy Products Co., Kingsport, Tenn.
Reeser's Milk Company, Allentown, Pa.
Sapulpa Creamery, Sapulpa, Okla.
Sherman Dairy Company, South Haven, Mich.
Smith Dairy Products Co., Orrville, Ohio.
Sunrise Dairy, Gastonia, N. C.

Licenser.—Krim-Ko Company, Chicago, manufactures the Krim-Ko Chocolate Flavored Drink Base and licenses its use, the name Krim-Ko, and standard advertising under definite contract conditions.

Description.—Pasteurized chocolate flavored sweetened skim milk; contains skim milk (from 0.5 to 1.5 per cent milk fat), sucrose, chocolate and cocoa, tapioca flour, salt and traces of tartaric acid and agar; flavored with vanilla, vanillin and coumarin. See Krim-Ko Chocolate Flavored Drink (THE JOURNAL, June 30, 1934, p. 2187).

RED & WHITE BRAND EVAPORATED MILK

Distributor.—Red & White Corporation, Chicago.

Packers.—Manufacturers of accepted brands of evaporated milk.

Description.—Canned, evaporated milk complying with United States Department of Agriculture definition and standard.

FAIRWAY BRAND IODIZED TABLE SALT

Distributor.—Twin City Wholesale Grocer Company, St. Paul.

Manufacturer.—The Ohio Salt Company, Wadsworth, Ohio.

Description.—Table salt containing added magnesium carbonate (1 per cent) for preserving its free-running properties, sodium bicarbonate (0.1 per cent) and potassium iodide (0.02 per cent by weight); the same as Chippewa Iodized Salt (THE JOURNAL, Sept. 28, 1935, p. 1039).

LOEB'S BRAND HAWAIIAN PINEAPPLE JUICE

Distributor.—Loeb Dietetic Food Company, New York.

Packer.—Hawaiian Pineapple Company, Ltd., San Francisco.

Description.—Canned Hawaiian pineapple juice retaining in high degree the natural vitamin content; the same as the accepted Dole Hawaiian Finest Quality Pineapple Juice (Unsweetened) (THE JOURNAL, June 3, 1933, p. 1769).

Analysis (submitted by packer).—

	per cent
Moisture	85.3
Ash	0.4
Protein (N × 6.25)	0.3
Fat (ether extract)	0.3
Crude fiber	0.02
Reducing sugars as invert sugar	12.4
Carbohydrates (by difference)	12.8
Titratable acidity as citric	0.9

Calories.—0.6 per gram; 17 per ounce.

CELLU 10% FRUIT SALAD COMBINATION PACKED IN WATER WITHOUT ADDED SUGAR OR SALT

Distributor.—The Chicago Dietetic Supply House, Inc., Chicago.

Packer.—Hunt Brothers Packing Company, San Francisco.

Description.—Canned fruit mixture of cooked peaches, pears, apricots, pineapple and white cherries packed in water without added sugar or salt.

Manufacture.—Canned peaches, pears, apricots, pineapple and white cherries packed in water without added sugar or salt are combined in definite proportions and processed as described for Cellu Blackberries Packed in Water Without Added Sugar or Salt (THE JOURNAL, Sept. 28, 1935, p. 1039).

Analysis (submitted by distributor).—

	Edible portion per cent
Moisture	90.0
Total solids	10.0
Ash	0.3
Fat (ether extract)	0.1
Protein (N × 6.25)	0.3
Reducing sugars as invert sugar	4.8
Sucrose	2.6
Crude fiber	0.6
Carbohydrates other than crude fiber (by difference)	8.7

Calories.—0.4 per gram; 11 per ounce.

Claims of Distributor.—For diets in which sweetened fruit is proscribed.

CALIFORNIA ORANGE JUICE

1. AMERICAN LADY BRAND
2. DEL RAY BRAND
3. EDELWEISS BRAND
4. IRIS BRAND
5. TOPMOST BRAND

Distributors.—1 and 5. General Grocer Company, St. Louis. 2. Delray Corporation, San Francisco. 3. John Sexton & Company, Chicago and Brooklyn. 4. Haas Baruch & Company, Los Angeles.

Packer.—TreeSweet Products Company, Los Angeles.

Description.—Heated California Valencia Orange Juice practically equivalent to fresh orange juice in vitamin C content. The same as TreeSweet Pure California Orange Juice (THE JOURNAL, June 15, 1935, p. 2187).

SURVEY OF TUBERCULOSIS HOSPITALS AND SANATORIUMS IN THE UNITED STATES

BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

(See Index, page 1915)

A plan for the survey of tuberculosis hospitals and sanatoriums in the United States was adopted by the Council on Medical Education and Hospitals in October 1932 and was authorized by the House of Delegates of the American Medical Association at its session the following year. This was no new venture but was in conformity with a well defined program of hospital service. To collect and disseminate information about hospitals is one of the functions of the Council, which is not limited to any particular field.

The plan of survey was, in a large part, developed and its execution directed by Fritjof H. Arestad, M.D., a member of the Council's staff of hospital examiners, who also made a majority of the visits to these hospitals and supervised the preparation of the statistics.

In undertaking this survey, the Council recognized that the medical profession at large is concerned with the problem of tuberculosis control and therefore interested in obtaining a better knowledge of the tuberculosis field. The problem of tuberculosis is not limited to specialists but is one in which the average physician has a share not only from the point of view of diagnosis and treatment but also from the broader aspect of public health. Likewise, tuberculosis hospitalization is no longer the exclusive function of the sanatorium field but has extended into the general hospitals and into other institutions of special service.

PURPOSE OF SURVEY

The purpose of the survey was not to standardize the tuberculosis hospitals but rather to (1) appraise institutions for the American Medical Association's Hospital Register, (2) evaluate educational facilities for the training of resident physicians, (3) collect factual data about all tuberculosis institutions in the United States, and (4) present to the medical profession a report of the hospital facilities now available in the United States for the treatment of tuberculosis. An opportunity was afforded to study the educational facilities available for the training of medical students, interns, resident physicians and other graduate physicians. The Council has approved a number of tuberculosis hospitals and sanatoriums for the training of resident physicians and has extended its approval to postgraduate courses in a few of the most important institutions.

METHOD OF SURVEY

The plan of the survey differed little from the methods employed by the Council in its dealings with the medical schools and with other hospitals. As in the past, reliance was placed on personal inspections followed by a supplementary questionnaire. Although the investigation represented a concentrated study of a particular hospital field, it was conveniently combined with the routine inspections of other hospitals. The work was carried out by the Council's regular staff of hospital examiners and required two years for completion. During that time, visits of inspection were made to all sanatoriums, preventoriums and the principal tuberculosis departments of other hospitals. All together, 656 institutions were inspected exclusive of tuberculosis departments in nervous and mental hospitals that had been surveyed during 1931 and 1932.

Throughout the investigation, an outlined plan was followed to insure uniformity of information and reports. The personal inspections were concerned with the following features: (1) physical plant, including location, ownership and control, finances, general utilities, food service, and bed capacity; (2) special medical facilities, such as x-ray, laboratory, necropsy facilities, pneumothorax equipment, facilities for minor, major and chest surgery, dental equipment, pharmacy, and heliotherapy; (3) staff and personnel, with reference to the regular medical staff, attending and consulting physicians, dental staff, and nursing, technical and general personnel; (4) medical service, including admission procedure, diagnostic service, general treatment and special therapeutic procedures in the form of pneumothorax, phrenic nerve operations, thoracoplasties, and so on; (5) records—administrative, clinical and statistical; and (6) special features, such as educational activities, research, medical library, community service, recreational facilities, occupational therapy and rehabilitation.

Since the investigation took two years, it was to be expected that changes would occur in some of the institutions that were included in the first part of the survey. In order to record such changes and to supplement the information obtained by inspection, a questionnaire was prepared which in itself was a comprehensive report containing 208 separate items. The form was designed with the assistance of the officials of the American Sanatorium Association and the National Tuberculosis Association, whose continued loyal support contributed largely to the success of the survey. Subsequently, many sanatorium superintendents offered valuable suggestions, so that the questionnaire in its final form represented not only the opinion of the Council but also the knowledge and experience of those who are more closely connected with the tuberculosis field.

SCOPE OF SURVEY

Questionnaires were sent to 471 sanatoriums and to 133 of the principal tuberculosis departments. Not only were returns received from 98.9 per cent of the sanatoriums and 92.5 per cent of the tuberculosis departments, but the forms were filled out with unusual accuracy and completeness. Reports were obtained also from fourteen preventoriums and from approximately 5,600 other hospitals which had been requested to report the number of beds available for the treatment of tuberculosis, the number of tuberculous patients admitted last year, and the number of tuberculous patients now under treatment.

The data obtained by inspections and by hospital reports were later supplemented by information supplied by state departments of health and state anti-

tuberculosis associations. By this means the Council was able to obtain a more complete picture of the local tuberculosis problems as well as a clearer understanding of the various methods of tuberculosis control.

The report that follows, therefore, covers 471 sanatoriums, 740 tuberculosis departments and twenty-nine preventoriums, a total of 1,240 institutions. It is based on (1) the inspection of 656 tuberculosis institutions, (2) data obtained from 602 tuberculosis questionnaires, (3) reports from 5,600 other hospitals, and (4) information supplied by state health departments and state antituberculosis associations.

A classification on the basis of control shows 169 federal institutions offering facilities for the treatment of tuberculosis, 284 state institutions, 250 operated by counties, eighty by municipalities, twenty-four conducted jointly under city and county control, and 433 institutions under private management. Table 1, which lists the tuberculosis institutions by states and according to control, shows the sanatoriums, departments and preventoriums classified as follows:

Table 1.—Classification of Tuberculosis Institutions by States and by Control

State	Federal		State		County			City		City-County			Private			Totals			
	Sanatoriums	Departments	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Total Institutions
Alabama	..	3	..	4	3	..	..	..	..	..	..	..	1	1	..	4	8	..	12
Arizona	4	9	..	..	2	3	..	..	..	..	..	..	12	4	1	18	16	1	35
Arkansas	..	3	2	2	..	2	..	..	..	..	..	..	..	..	..	2	7	..	9
California	1	11	..	8	10	21	3	..	..	1	1	..	24	10	5	36	51	8	95
Colorado	..	3	..	2	..	2	..	..	..	..	1	..	17	9	..	17	17	..	34
Connecticut	..	..	5	2	..	..	..	..	3	..	..	..	2	2	..	7	7	..	14
Delaware	..	..	2	1	..	..	..	..	..	..	..	..	..	..	1	2	1	1	4
District of Columbia	..	4	..	..	..	..	..	2	1	..	..	..	..	2	..	2	7	..	9
Florida	..	2	..	3	2	3	..	..	3	..	..	..	1	3	2	3	14	2	19
Georgia	..	5	1	2	1	..	..	..	..	2	..	..	1	1	1	5	8	1	14
Idaho	1	1	..	1	..	..	..	..	..	..	..	..	..	5	..	1	7	..	8
Illinois	..	6	..	14	16	2	..	2	1	1	..	..	7	13	1	26	36	1	63
Indiana	..	4	1	7	8	..	..	..	..	..	..	..	..	1	..	9	12	..	21
Iowa	1	2	1	9	4	..	..	..	..	..	..	..	..	2	..	6	13	..	19
Kansas	..	4	1	4	1	..	..	..	..	1	..	..	..	9	..	3	17	..	20
Kentucky	1	1	1	2	1	1	..	..	1	1	..	..	..	5	..	4	10	..	14
Louisiana	..	2	1	4	..	..	..	..	..	..	..	..	2	..	..	3	6	..	9
Maine	..	3	3	3	..	..	..	..	..	..	..	..	1	4	..	4	10	..	14
Maryland	..	2	4	6	..	..	..	1	..	..	..	..	3	3	..	8	11	..	19
Massachusetts	1	3	4	13	7	1	..	4	8	..	..	..	7	8	1	23	33	1	57
Michigan	..	2	2	10	11	3	..	2	3	..	..	..	8	7	1	23	25	1	49
Minnesota	..	4	1	9	13	..	..	..	..	..	1	1	2	6	..	16	20	1	37
Mississippi	..	1	1	2	..	..	..	..	..	..	..	..	1	..	..	2	3	..	5
Missouri	..	4	1	5	2	..	..	2	7	..	..	..	2	4	1	7	20	1	28
Montana	..	5	1	..	..	..	..	..	..	..	1	..	..	1	..	1	7	..	8
Nebraska	..	2	1	1	..	1	..	..	1	..	..	..	..	3	..	1	8	..	9
Nevada	..	1	..	..	..	3	..	..	..	..	..	..	..	..	..	..	4	..	4
New Hampshire	..	1	1	1	..	..	..	..	..	..	..	..	1	1	..	2	3	..	5
New Jersey	..	1	1	4	9	3	..	..	5	..	..	..	6	7	1	16	20	1	37
New Mexico	3	8	..	..	..	..	..	..	..	..	..	..	5	8	..	8	16	..	24
New York	2	7	4	28	28	4	2	5	15	1	..	..	20	22	2	60	76	4	140
North Carolina	1	1	1	3	7	2	..	..	..	..	..	..	14	3	..	23	9	..	32
North Dakota	..	2	1	3	..	..	..	..	..	..	..	..	..	3	..	1	8	..	9
Ohio	..	3	1	13	14	1	..	1	2	1	..	..	4	16	1	21	35	1	57
Oklahoma	2	3	3	4	..	..	..	..	1	..	..	..	1	6	..	6	14	..	20
Oregon	..	2	2	2	1	1	..	..	..	..	..	..	1	3	..	4	8	..	12
Pennsylvania	..	5	3	15	3	6	..	1	3	1	1	..	9	26	1	17	56	1	74
Rhode Island	..	1	1	3	..	..	..	..	1	..	..	..	1	1	1	2	6	1	9
South Carolina	..	..	1	1	3	1	..	..	..	1	..	..	1	4	..	6	6	..	12
South Dakota	..	4	1	..	..	..	..	..	..	..	..	..	..	..	..	1	4	..	5
Tennessee	..	2	..	4	1	..	..	..	..	2	..	1	4	4	..	7	10	1	18
Texas	..	5	1	7	2	3	..	..	1	3	2	..	11	7	..	17	25	..	42
Utah	..	2	..	..	..	1	..	..	..	..	..	..	..	2	..	..	5	..	5
Vermont	..	..	2	..	..	..	..	..	..	..	..	..	..	1	1	2	1	1	4
Virginia	..	3	3	5	..	..	..	2	1	..	..	..	2	1	..	7	10	..	17
Washington	1	7	..	2	5	1	..	..	1	..	..	..	3	8	..	9	19	..	28
West Virginia	..	1	3	4	2	..	..	..	..	..	..	..	2	2	..	7	7	..	14
Wisconsin	..	4	2	5	17	6	1	..	..	..	..	..	2	5	..	21	20	1	42
Wyoming	..	2	1	1	..	..	..	..	..	..	..	..	..	1	..	1	4	..	5
Totals	18	151	65	219	173	71	6	22	58	15	7	2	178	234	21	471	740	29	1,240

Classification by Control

	Sanatoriums	Departments	Preventoriums	Total
Federal	18	151	..	169
State	65	219	..	284
County	173	71	6	250
City	22	58	..	80
City-county	15	7	2	24
Private	178	234	21	433
Totals	471	740	29	1,240

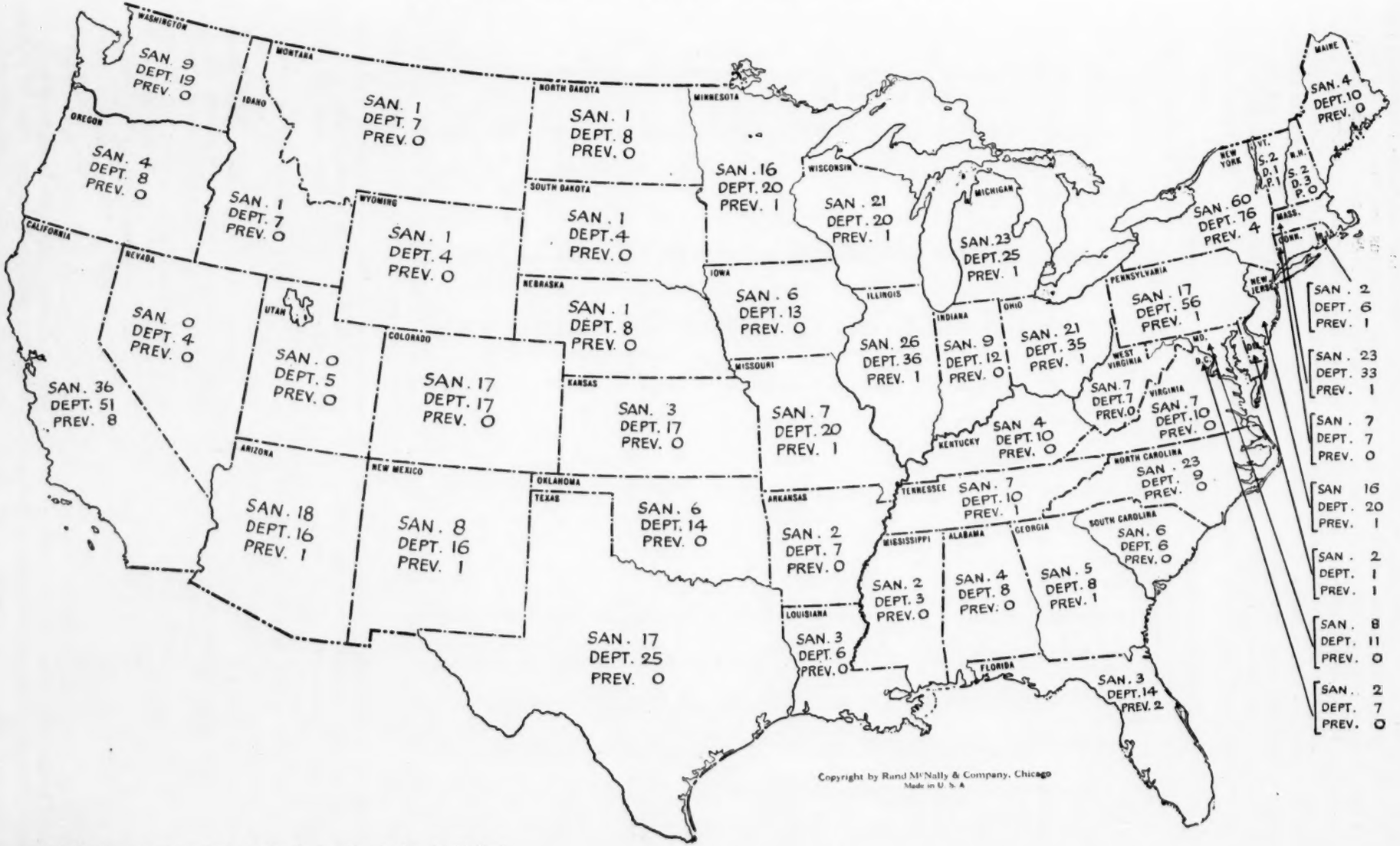
METHOD OF CLASSIFICATION OF TUBERCULOSIS INSTITUTIONS

For the purpose of this report the institutions can first of all be separated into three groups: the sanatoriums, the tuberculosis departments of other hospitals, and the preventoriums. The term "sanatorium" has been limited to institutions operated exclusively for tuberculosis, "tuberculosis department" signifies a tuberculosis service in conjunction with any other hospital activity, and the term "preventorium" is applied to children's units operated independently and on a permanent basis. Consequently, the list of preventoriums will not show preventorium units conducted as part of a sanatorium and will not include summer camps for children.

NUMBER, SIZE AND DISTRIBUTION OF TUBERCULOSIS INSTITUTIONS

There are 471 sanatoriums for the treatment of tuberculosis. Reference to the foregoing tabulation will show that eighteen are federal, sixty-five state owned, 173 county, twenty-two city, fifteen city and county, and 178 privately controlled. According to table 2, which shows the tuberculosis institutions by

DISTRIBUTION OF TUBERCULOSIS INSTITUTIONS



Distribution of tuberculosis institutions. Totals for the United States: sanatoriums, 471; tuberculosis departments of hospitals, 740; preventoriums, twenty-nine.

states and by size, there are 41 sanatoriums of less than 25 beds, 90 of 25 to 49 beds, 132 of 50 to 99 beds, and 208 which have a capacity of 100 beds or over.

The distribution of the sanatoriums as shown in the map and in table 1 corresponds closely to the density of population except in a few states where climatic conditions have influenced the development of sanatorium facilities beyond local needs. There are eight states with more than twenty sanatoriums each, six have from ten to twenty, thirty-three states have less than ten, and two have no sanatorium facilities.

The tuberculosis departments, which number 740 in all, are also shown in table 1. Of these, 151 are federal, 219 state, seventy-one county, fifty-eight city, seven city and county, and 234 under private control. An analysis of the reports shows that 418 tuberculosis departments are connected with general hospitals, twenty-six with isolation hospitals, 193 with nervous and mental institutions, twenty-one with orthopedic hospitals, seventeen are connected with other hospitals, and sixty-five are departments of institutions, including sixteen homes for the aged and forty-eight reformatories and prisons.

The extent to which isolation facilities have been provided for tuberculosis in general and other hospitals is illustrated by the table in the adjoining column, which shows that 225 tuberculosis departments are housed in separate buildings, 304 occupy separate wings, wards, floors or porches, and in 211 the degree of segregation was not reported.

The variation in size of the tuberculosis departments is of some significance. In general, the larger departments may be considered part of the regular sanatorium service in a community, whereas the great number of small departments can be taken as an indication of the extent to which tuberculosis hospitalization has been developed in the general hospital field. Eighty departments are of 100 beds or over, eighty-two have a capacity of from fifty to ninety-nine beds, ninety-four have from twenty-five to forty-nine beds, and 484 have less than twenty-five beds. The second column in table 2 showing tuberculosis departments of less than twenty-five beds includes 266 that did not report the number of beds set aside for tuberculosis.

Table 2.—Tuberculosis Institutions According to Size and by States

State	Less Than 25 Beds			25 to 49 Beds			50 to 99 Beds			100 Beds and Over			Total Sanatoriums	Total Departments	Total Preventoriums	Total Institutions
	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums				
Alabama	1	5	..	..	1	..	2	2	..	1	..	..	4	8	..	12
Arizona	4	12	1	10	1	..	3	1	..	1	2	..	18	16	1	35
Arkansas	..	5	..	1	..	..	..	1	..	1	1	..	2	7	..	9
California	6	25	1	5	7	4	12	11	3	13	8	..	36	51	8	95
Colorado	2	12	..	3	1	..	6	3	..	6	1	..	17	17	..	34
Connecticut	..	3	..	..	3	..	1	1	..	6	..	..	7	7	..	14
Delaware	..	1	1	1	..	..	..	..	..	1	..	..	2	1	1	4
District of Columbia	..	4	..	..	1	..	..	..	..	2	2	..	2	7	..	9
Florida	2	11	1	..	3	1	1	..	..	..	..	..	3	14	2	19
Georgia	1	5	1	2	1	..	..	1	..	2	1	..	5	8	1	14
Idaho	..	7	..	..	..	..	..	..	..	1	..	..	1	7	..	8
Illinois	1	22	1	6	3	..	12	4	..	7	7	..	26	36	1	63
Indiana	..	8	..	1	3	..	2	1	..	6	..	..	9	12	..	21
Iowa	..	9	..	..	2	..	3	2	..	3	..	..	6	13	..	19
Kansas	..	14	..	..	1	..	2	2	..	1	..	..	3	17	..	20
Kentucky	..	8	..	..	..	..	2	1	..	2	1	..	4	10	..	14
Louisiana	..	1	..	..	1	..	1	1	..	2	3	..	3	6	..	9
Maine	..	9	..	1	1	..	..	..	..	3	..	..	4	10	..	14
Maryland	..	9	..	1	1	..	2	1	..	5	..	..	8	11	..	19
Massachusetts	3	18	..	2	6	1	3	5	..	15	4	..	23	33	1	57
Michigan	2	12	1	3	4	..	8	7	..	10	2	..	23	25	1	49
Minnesota	2	10	..	4	5	..	6	3	1	4	2	..	16	20	1	37
Mississippi	..	1	..	1	1	..	..	..	..	1	1	..	2	3	..	5
Missouri	1	10	..	..	6	..	1	4	1	5	..	..	7	20	1	28
Montana	..	6	..	..	1	..	..	..	..	1	..	..	1	7	..	8
Nebraska	..	6	..	..	1	..	..	1	..	1	..	..	1	8	..	9
Nevada	..	4	..	..	..	..	..	..	..	..	..	..	..	4	..	4
New Hampshire	..	3	..	..	..	..	..	..	..	2	..	..	2	3	..	5
New Jersey	1	11	..	3	4	..	4	1	..	8	4	1	16	20	1	37
New Mexico	..	11	..	..	1	..	5	2	..	3	2	..	8	16	..	24
New York	3	42	2	12	5	..	12	6	1	33	23	1	60	76	4	140
North Carolina	5	6	..	9	1	..	3	2	..	6	..	..	23	9	..	32
North Dakota	..	7	..	..	1	..	..	..	..	1	..	..	1	8	..	9
Ohio	..	23	..	3	6	..	5	3	1	12	3	..	21	35	1	57
Oklahoma	..	11	..	..	1	..	2	2	..	4	..	..	6	14	..	20
Oregon	..	6	..	1	2	..	1	..	..	2	..	..	4	8	..	12
Pennsylvania	1	40	..	1	6	..	3	5	..	12	5	1	17	56	1	74
Rhode Island	..	5	..	..	..	..	1	1	1	1	..	..	2	6	1	9
South Carolina	..	5	..	2	..	..	3	1	..	1	..	..	6	6	..	12
South Dakota	..	3	..	..	..	..	..	1	..	1	..	..	1	4	..	5
Tennessee	1	4	..	2	3	..	..	2	1	4	1	..	7	10	1	18
Texas	2	17	..	3	4	..	7	2	..	5	2	..	17	25	..	42
Utah	..	4	..	..	1	..	..	..	..	..	..	..	..	5	..	5
Vermont	..	1	..	1	..	1	1	..	..	..	..	..	2	1	1	4
Virginia	..	6	..	1	1	..	2	2	..	4	1	..	7	10	..	17
Washington	1	14	..	2	2	..	3	..	..	3	3	..	9	19	..	28
West Virginia	1	6	..	3	1	..	1	..	..	2	..	..	7	7	..	14
Wisconsin	1	18	..	5	1	..	12	..	..	4	1	1	21	20	1	42
Wyoming	..	4	..	1	..	..	..	..	..	..	..	..	1	4	..	5
Totals	41	484	9	90	94	7	132	82	9	208	80	4	471	740	29	1,240

Isolation Facilities for Tuberculosis

Type of Hospital	Separate Building	Segregated Unit	Not Designated	Total
General	86	175	157	418
Nervous and mental	102	72	19	193
Tuberculosis and isolation	13	13	..	26
Orthopedic	2	..	19	21
Hospital departments of institutions	20	37	8	65
All other hospitals	2	7	8	17
Totals	225	304	211	740

All states have hospitals with tuberculosis departments, as shown in table 1. Eight have more than twenty each, eighteen have from ten to twenty, sixteen have from five to nine, and in seven states there are less than five tuberculosis departments.

There are twenty-nine preventoriums that are operated as independent institutions. Twenty-one are privately owned, six are county institutions, and two are operated jointly under city and county control. The men, 25,716 for women, 11,647 for children, and 22,284 unassigned. Four hundred and seventy-one sanatoriums operated exclusively for tuberculosis have 64,997 beds, the 740 tuberculosis departments have 28,534 beds, and the twenty-nine preventoriums reported 1,667 beds.

There are 14,468 tuberculosis beds in general hospitals, 9,478 in nervous and mental institutions, 2,556 in tuberculosis and isolation hospitals, 1,322 in depart-

Table 3.—Bed Capacity of Tuberculosis Institutions Classified by States

State	Sanatoriums					Departments					Preventoriums	Total Beds					Tuberculosis Beds Planned
	Beds for Men	Beds for Women	Beds for Children	Unassigned	Total	Beds for Men	Beds for Women	Beds for Children	Unassigned	Total	Beds for Children	For Men	For Women	For Children	Unassigned	Total	
Alabama	93	113	36	...	242	111	...	...	109	220	...	204	113	36	109	462	65
Arizona	271	176	45	313	805	583	5	...	115	703	10	854	181	55	428	1,518	64
Arkansas	199	269	88	...	556	...	...	...	234	234	...	199	269	88	234	790	...
California	1,304	1,148	521	1,043	4,016	1,420	530	191	814	2,955	418	2,724	1,678	1,130	1,857	7,389	502
Colorado	564	442	112	625	1,743	654	80	...	214	948	...	1,218	522	112	839	2,691	25
Connecticut	674	559	442	...	1,675	46	46	6	142	240	...	720	605	448	142	1,915	304
Delaware	57	60	44	...	161	...	...	...	...	...	22	57	60	66	...	183	60
District of Columbia	120	100	150	...	370	40	40	20	196	296	...	160	140	170	196	666	750
Florida	37	29	...	20	86	47	40	...	111	198	46	84	69	46	131	330	35
Georgia	217	251	153	24	645	...	...	...	627	627	13	217	251	166	651	1,285	40
Idaho	...	...	132	...	132	24	...	...	60	84	...	24	...	132	60	216	...
Illinois	1,365	1,344	328	441	3,478	416	161	25	1,300	1,902	24	1,781	1,505	377	1,741	5,404	102
Indiana	491	564	302	...	1,357	...	...	...	229	229	...	491	564	302	229	1,586	275
Iowa	128	173	110	363	774	...	...	...	207	207	...	128	173	110	570	981	25
Kansas	152	194	42	...	388	...	...	...	183	183	...	152	194	42	183	571	40
Kentucky	559	278	112	...	949	...	...	...	257	257	...	559	278	112	257	1,206	50
Louisiana	148	148	30	...	326	157	...	...	570	727	...	305	148	30	570	1,053	100
Maine	174	227	81	...	482	7	9	...	78	94	...	181	236	81	78	576	45
Maryland	629	492	174	55	1,350	...	...	...	200	200	...	629	492	174	255	1,550	135
Massachusetts	1,768	1,225	835	235	4,063	414	283	107	453	1,257	30	2,182	1,508	972	688	5,350	150
Michigan	1,430	1,170	416	339	3,355	529	446	11	630	1,616	20	1,959	1,616	447	969	4,991	109
Minnesota	872	922	89	77	1,960	204	10	5	626	845	80	1,076	932	174	703	2,885	200
Mississippi	23	24	...	480	527	...	...	...	245	245	...	23	24	...	725	772	...
Missouri	606	689	117	...	1,412	61	108	...	384	553	85	667	797	202	384	2,050	573
Montana	82	38	30	...	150	...	...	...	110	110	...	82	38	30	110	260	60
Nebraska	51	76	33	...	160	47	53	5	42	147	...	98	129	38	42	307	35
Nevada	...	...	...	...	...	...	...	...	18	18	...	...	...	...	18	18	...
New Hampshire	94	91	25	...	210	...	...	...	20	20	...	94	91	25	20	230	20
New Jersey	1,154	919	338	57	2,468	218	150	70	442	880	247	1,372	1,069	655	499	3,595	202
New Mexico	411	89	66	304	870	401	25	...	257	683	...	812	114	66	561	1,553	50
New York	5,043	3,084	1,462	61	9,650	1,552	873	170	2,085	4,680	252	6,595	3,957	1,884	2,146	14,582	1,029
North Carolina	1,263	513	138	538	2,452	...	...	...	173	173	...	1,263	513	138	711	2,625	90
North Dakota	94	121	50	...	265	7	7	...	62	76	...	101	128	50	62	341	83
Ohio	1,235	1,250	663	66	3,214	450	154	...	792	1,396	60	1,685	1,404	723	858	4,670	238
Oklahoma	342	373	113	60	888	...	...	...	188	188	...	342	373	113	248	1,076	60
Oregon	70	69	...	374	513	...	...	...	109	109	...	70	69	...	483	622	130
Pennsylvania	1,696	1,508	702	283	4,189	527	304	30	1,153	2,004	100	2,223	1,812	822	1,436	6,293	269
Rhode Island	224	204	67	...	495	...	...	...	60	60	50	224	204	117	60	605	70
South Carolina	174	247	64	54	539	34	34	30	38	136	...	208	281	94	92	675	50
South Dakota	96	96	...	...	192	90	...	...	15	105	...	186	96	...	15	297	...
Tennessee	403	410	259	52	1,124	...	...	...	398	398	50	403	410	309	450	1,572	...
Texas	634	558	240	539	1,971	90	28	...	776	894	...	724	586	240	1,315	2,865	75
Utah	...	...	...	...	...	19	13	...	22	54	...	19	13	...	22	54	50
Vermont	64	63	...	...	127	...	...	...	...	...	44	64	63	44	...	171	...
Virginia	471	543	84	25	1,123	23	23	6	250	302	...	494	566	90	275	1,425	...
Washington	194	195	67	295	751	288	120	278	94	780	...	482	315	345	389	1,531	53
West Virginia	287	284	136	65	772	...	...	...	77	77	...	287	284	136	142	849	229
Wisconsin	861	827	140	161	1,989	254	...	...	138	392	116	1,115	827	256	299	2,497	169
Wyoming	14	19	...	...	33	...	...	...	32	32	...	14	19	...	32	65	50
Totals	26,838	22,174	9,036	6,949	64,997	8,713	3,542	944	15,335	28,534	1,667	35,551	25,716	11,647	22,284	95,198	6,661

capacity varies from ten to 247 beds. Nine institutions have less than twenty-five beds, seven from twenty-five to forty-nine beds, nine from fifty to ninety-nine beds, and in four the capacity is 100 beds or over. There are eight preventoriums listed in California, four in New York, two in Florida, one in each of fifteen states, and none in thirty-one.

The foregoing figures do not represent all the facilities for children, however, for there are more than 250 sanatoriums and tuberculosis departments that admit children for sanatorium or preventorium care. These facilities are included in the sanatorium classification and are described under "Hospitalization of Children."

BED CAPACITY

Reports from 1,240 institutions indicate that there are at present 95,198 beds available in the United States for the treatment of tuberculosis, 35,551 for ments of institutions including prisons and reformatories, 435 beds in orthopedic hospitals, and 275 in others. Many of the orthopedic hospitals reported a variable bed capacity for tuberculosis in accordance with needs. Two hundred and sixty-six tuberculosis departments that did not specify the number of beds have at present 2,156 patients under treatment.

The number of available beds for Negroes cannot be stated definitely. However, 104 institutions report 3,751 beds for colored patients, and 171 additional hospitals state that beds are made available for Negroes in accordance with demands for hospitalization.

New construction for tuberculosis may add 6,661 beds. Private institutions report plans for 487 new beds, and the state and local public institutions indicate that new construction may increase their capacity by 6,124 beds.

New York State has the greatest number of beds for tuberculosis, 14,582; California is next with 7,389, Pennsylvania has 6,293, Illinois 5,404, Massachusetts 5,350, Michigan 4,991, Ohio 4,670 and New Jersey 3,595 beds. Six states have between 2,000 and 3,000 beds, twelve states have from 1,000 to 2,000 beds each, ten states have from 500 to 1,000 beds, and thirteen states have less than 500, including Nevada, Utah and Wyoming, which do not exceed 100 beds.

In table 3 the bed capacity of tuberculosis institutions has been classified by states. Table 4, which represents capacity by control and by states, shows that there are 10,940 beds in federal hospitals, 66,592 in other public institutions, and 17,666 beds for tuberculosis in privately owned sanatoriums, hospitals and preventoriums. There are 4,103 beds in the federal sanatoriums and 6,837 in departments of federal hospitals. In the remaining group of public institutions the state sanatoriums have 17,308 beds, the county sanatoriums 20,114, those operated by municipalities 7,365, and the city and county sanatoriums 2,423. Departments of hospitals under state control have 9,792 beds for tuberculosis, county departments have 3,551, departments of city hospitals have 4,530, and hospital departments of city and county institutions have 1,015 beds. In the private sanatoriums there are 13,684 beds, and 2,809 beds are available for tuberculosis in departments of private hospitals. The six county preventoriums have 364 beds, two under city and county control have 130, and twenty-one privately owned preventoriums have 1,173 beds.

Table 4.—Bed Capacity of Tuberculosis Institutions by Control and by States

State	Federal		State		County			City		City-County			Private			Number of Beds			
	Sanatoriums	Departments	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Total Beds, All Institutions
Alabama	...	53	...	167	182	...	...	...	...	...	...	...	60	...	...	242	220	...	462
Arizona	256	575	...	25	82	...	...	...	...	...	...	...	467	103	10	805	703	10	1,518
Arkansas	...	82	556	108	...	44	...	...	...	...	...	...	...	...	...	556	234	...	790
California	244	888	...	340	2,300	1,284	176	...	...	82	415	...	1,390	28	242	4,016	2,955	418	7,389
Colorado	...	536	...	39	...	7	...	...	...	...	80	...	1,743	286	...	1,743	948	...	2,691
Connecticut	...	...	1,483	136	...	...	...	...	56	...	...	...	192	48	...	1,675	240	...	1,915
Delaware	...	...	161	...	...	...	...	...	...	...	...	...	...	...	22	161	...	22	183
Dist. of Columbia	...	196	...	...	...	...	...	370	100	...	...	...	...	...	...	370	296	...	666
Florida	...	26	...	62	76	55	...	...	42	...	...	...	10	13	46	86	198	46	330
Georgia	...	81	337	541	30	...	...	...	...	242	...	...	36	5	13	645	627	13	1,285
Idaho	132	24	...	12	...	...	...	...	...	...	...	...	...	48	...	132	84	...	216
Illinois	...	349	...	946	1,486	351	...	1,299	6	110	...	...	583	250	24	3,478	1,902	24	5,404
Indiana	...	84	211	141	1,146	...	...	...	...	...	...	...	...	4	...	1,357	229	...	1,586
Iowa	80	77	363	130	331	...	...	...	...	...	...	...	...	...	...	774	207	...	981
Kansas	...	67	268	110	60	...	...	...	...	60	...	...	...	6	...	388	183	...	571
Kentucky	375	...	80	222	90	20	...	...	...	404	...	...	...	15	...	949	257	...	1,206
Louisiana	...	206	96	521	...	...	...	...	...	...	...	...	230	...	...	326	727	...	1,053
Maine	...	12	452	58	...	...	...	...	...	...	...	...	30	24	...	482	94	...	576
Maryland	...	68	896	132	...	...	...	179	...	...	...	...	275	...	...	1,350	200	...	1,550
Massachusetts	472	16	1,241	640	1,176	28	...	744	426	...	...	...	430	147	30	4,063	1,257	30	5,350
Michigan	...	36	866	392	809	160	...	980	802	...	...	...	700	226	20	3,355	1,616	20	4,991
Minnesota	...	286	390	261	1,494	...	...	...	...	...	215	80	76	83	...	1,960	845	80	2,885
Mississippi	...	4	480	241	...	...	...	...	...	...	...	...	47	...	...	527	245	...	772
Missouri	...	87	405	228	118	...	...	668	232	...	...	...	221	6	85	1,412	553	85	2,050
Montana	...	100	150	...	...	...	...	...	...	...	10	...	...	...	...	150	110	...	260
Nebraska	...	40	160	6	...	90	...	...	8	...	...	...	...	3	...	160	147	...	307
Nevada	...	...	...	...	...	18	...	...	...	...	...	...	...	...	...	...	18	...	18
New Hampshire	...	...	110	20	...	...	...	...	...	...	...	...	100	...	...	210	20	...	230
New Jersey	...	27	420	161	1,817	417	...	...	217	...	...	...	231	58	247	2,468	880	247	3,595
New Mexico	430	446	...	...	...	...	...	...	...	...	...	...	440	237	...	870	683	...	1,553
New York	999	263	300	1,842	3,075	333	72	2,509	1,549	135	...	...	2,632	693	180	9,650	4,680	252	14,582
North Carolina	850	...	484	160	486	13	...	...	...	...	...	...	632	...	...	2,452	173	...	2,625
North Dakota	...	18	265	55	...	...	...	...	...	...	...	...	...	3	...	265	76	...	341
Ohio	...	273	240	568	2,178	20	...	48	354	462	...	...	286	181	60	3,214	1,396	60	4,670
Oklahoma	225	85	603	100	...	...	...	...	...	...	...	...	60	3	...	888	188	...	1,076
Oregon	...	34	409	15	39	40	...	...	...	...	...	...	65	20	...	513	109	...	622
Pennsylvania	...	235	2,415	522	337	414	...	290	610	57	14	...	1,090	209	100	4,189	2,004	100	6,293
Rhode Island	...	...	430	...	...	...	...	...	60	...	...	...	65	...	50	495	60	50	605
South Carolina	...	...	277	...	166	98	...	...	...	26	...	...	70	38	...	539	136	...	675
South Dakota	...	105	192	...	...	...	...	...	...	...	...	...	...	...	...	192	105	...	297
Tennessee	...	71	...	319	300	...	...	...	...	503	...	50	321	8	...	1,124	398	50	1,572
Texas	...	523	718	236	102	84	...	...	16	342	31	...	809	4	...	1,971	894	...	2,865
Utah	...	...	...	...	...	32	...	...	...	...	...	...	...	22	...	...	54	...	54
Vermont	...	...	127	...	...	...	...	...	...	...	...	...	...	...	44	127	...	44	171
Virginia	...	20	760	230	...	...	...	278	52	...	...	...	85	...	...	1,123	302	...	1,425
Washington	40	503	...	27	575	...	...	...	...	...	250	...	136	...	...	751	780	...	1,531
West Virginia	...	18	648	55	49	...	...	...	...	...	...	...	75	4	...	772	77	...	849
Wisconsin	...	291	282	24	1,610	43	116	...	...	...	...	...	97	34	...	1,989	392	116	2,497
Wyoming	...	32	33	...	...	...	...	...	...	...	...	...	...	...	...	33	32	...	65
Totals	4,103	6,837	17,308	9,792	20,114	3,551	364	7,365	4,530	2,423	1,015	130	13,684	2,809	1,173	64,997	28,534	1,667	95,198

PATIENT POPULATION

To illustrate the extent of tuberculosis hospitalization in the United States it becomes necessary to show by figures the changes that occur annually in the patient population of tuberculosis institutions. The statistical data used for this purpose are based on reports received during 1934.

1. *Admissions.*—Reports from 458 sanatoriums, 607 tuberculosis departments and twenty-four preventoriums, representing 89,173 beds, or 93.7 per cent of the total capacity, indicate that there were 121,706 patients admitted during a twelve months period. Of this number 44,243 were men, 28,434 women, 15,523 children and 33,506 not classified. These figures include readmissions, which, according to a survey made by the National Tuberculosis Association in 1931, amount to nearly 7 per cent of the patients admitted. There are no data available to show the number of patients admitted by transfer from other tuberculosis institutions.

The sanatoriums admitted 70,601 patients: 27,520 men, 21,601 women, 10,394 children and 11,086 not designated. Of these patients, 5,078 were admitted in

the federal sanatoriums, 51,043 in the other public sanatoriums, and 14,480 in those under private control. Seven sanatoriums operated by fraternal organizations admitted 445 patients, twenty-three under church management had 3,196 admissions, and the remaining private sanatoriums admitted 10,839.

There were 47,007 admissions in the tuberculosis departments: 16,723 men, 6,833 women, 1,031 children and 22,420 not designated. Departments under federal control admitted 10,445 patients, those under private management had 6,839 admissions, and all others

In New York State there were 24,331 admissions reported, 10,093 in California, 9,133 in Pennsylvania, 6,430 in Illinois, 5,914 in Michigan and 5,908 in Ohio. Five states have less than 200 admissions annually; namely, Delaware, Nevada, New Hampshire, Utah and Wyoming. Total admissions by states are shown in table 5.

2. *Patients Treated.*—On the basis of reports from 559 tuberculosis institutions, representing 78,128 beds, or 82 per cent of the total capacity, there were 166,818 patients treated: 61,861 men, 40,938 women, 20,934

Table 5.—Number of Patients Admitted in Tuberculosis Institutions During Twelve Months Period
(According to Reports Received During 1934)

State	Sanatoriums					Departments					Preventoriums	Total Admissions	Number of Institutions Reporting			Number of Beds Represented		
	Men	Women	Children	Unclassified	Total	Men	Women	Children	Unclassified	Total	Children	All Institutions	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums
Alabama	122	148	16	...	286	599	...	...	84	683	...	969	4	5	..	242	135	...
Arizona	272	142	143	461	1,018	627	...	...	564	1,191	...	2,209	17	15	..	768	403	...
Arkansas	280	314	155	...	749	...	...	...	85	85	...	834	2	5	..	556	112	...
California	1,513	1,224	415	796	3,948	2,010	786	162	2,411	5,369	776	10,093	33	47	8	3,844	2,951	418
Colorado	486	250	80	321	1,137	149	104	1	1,116	1,370	...	2,507	17	16	..	1,743	914	...
Connecticut	511	372	236	195	1,314	118	111	3	130	362	...	1,676	7	5	..	1,675	104	...
Delaware	35	42	32	...	109	...	...	...	5	5	35	149	2	1	1	161	...	22
District of Columbia	125	85	122	...	332	137	146	38	454	775	...	1,107	2	7	..	370	296	...
Florida	30	18	...	...	48	32	30	...	250	312	520	880	1	10	2	66	123	46
Georgia	30	23	256	913	1,222	...	...	...	251	251	28	1,501	5	6	1	645	141	13
Idaho	...	...	197	...	197	19	...	...	70	89	...	286	1	6	..	132	72	...
Illinois	1,432	1,368	1,071	49	3,920	1,184	547	...	779	2,510	...	6,430	26	28	..	3,478	1,378	...
Indiana	389	434	435	284	1,542	...	...	...	156	156	...	1,698	9	9	..	1,357	145	...
Iowa	180	254	23	161	618	...	...	...	263	263	...	881	6	12	..	774	135	...
Kansas	106	130	123	67	426	...	...	...	316	316	...	742	3	16	..	388	143	...
Kentucky	1,130	362	88	...	1,580	...	...	...	304	304	...	1,884	4	7	..	949	158	...
Louisiana	158	116	23	...	297	330	...	...	209	539	...	836	3	4	..	326	357	...
Maine	100	144	42	205	491	...	...	...	125	125	...	616	4	7	..	482	68	...
Maryland	792	590	128	446	1,956	...	...	...	108	108	...	2,064	8	5	..	1,350	50	...
Massachusetts	1,608	1,038	506	274	3,426	327	176	50	684	1,237	195	4,858	23	30	1	4,063	1,207	30
Michigan	1,159	926	385	265	2,735	816	392	26	1,945	3,179	...	5,914	22	19	..	3,329	1,442	...
Minnesota	565	548	96	245	1,454	407	133	14	587	1,141	31	2,626	16	19	1	1,960	792	80
Mississippi	17	18	87	273	395	...	...	...	6	6	...	401	2	1	..	527	4	...
Missouri	573	528	68	229	1,398	400	360	...	1,153	1,913	150	3,461	7	17	1	1,412	355	85
Montana	93	66	37	...	196	...	...	...	126	126	...	322	1	6	..	150	95	...
Nebraska	65	94	...	...	159	...	...	...	229	229	...	388	1	7	..	160	144	...
Nevada	...	...	...	...	...	...	...	...	24	24	...	24	..	3	..	...	8	...
New Hampshire	24	27	...	86	137	...	...	...	16	16	...	153	2	2	..	210	...	...
New Jersey	1,149	873	500	428	3,040	392	276	89	376	1,133	620	4,793	14	18	1	2,428	832	247
New Mexico	296	140	15	213	664	384	24	4	432	844	...	1,508	8	15	..	870	683	...
New York	5,181	3,146	1,806	1,498	11,631	5,713	2,543	268	3,330	11,854	846	24,331	57	64	2	9,650	4,054	182
North Carolina	1,744	507	115	470	2,836	...	...	...	29	29	...	2,865	22	6	..	2,428	48	...
North Dakota	79	83	38	...	200	...	...	...	100	100	...	300	1	7	..	265	66	...
Ohio	1,153	1,307	437	547	3,444	855	253	...	1,156	2,264	200	5,908	21	27	1	3,214	1,016	60
Oklahoma	488	607	90	24	1,218	...	...	...	459	459	...	1,677	6	13	..	888	158	...
Oregon	162	200	35	65	462	...	...	...	132	132	...	594	4	7	..	513	89	...
Pennsylvania	1,845	1,568	1,175	625	5,213	1,517	751	68	1,350	3,686	234	9,133	17	41	1	4,189	1,481	100
Rhode Island	204	168	40	...	412	96	54	...	41	191	251	854	2	5	1	495	60	50
South Carolina	82	71	71	341	565	6	23	7	166	202	...	767	6	5	..	539	136	...
South Dakota	42	59	...	...	101	103	...	...	139	242	...	343	1	4	..	192	105	...
Tennessee	355	375	223	26	979	...	...	...	197	197	32	1,208	7	6	1	1,124	180	50
Texas	1,378	1,532	475	300	3,685	73	37	...	884	994	...	4,679	17	19	..	1,971	708	...
Utah	...	...	...	...	...	29	15	...	82	126	...	126	..	5	..	...	54	...
Vermont	75	62	...	...	137	...	...	...	27	27	83	247	2	1	1	127	...	44
Virginia	217	300	126	718	1,361	29	23	5	250	307	...	1,668	7	9	..	1,123	302	...
Washington	285	333	71	97	786	174	49	296	172	691	...	1,477	9	17	..	751	774	...
West Virginia	230	342	73	152	797	...	...	...	133	133	...	930	7	4	..	772	62	...
Wisconsin	745	651	241	312	1,949	197	...	...	487	684	97	2,730	21	16	1	1,989	380	116
Wyoming	15	16	...	...	31	...	...	...	28	28	...	59	1	3	..	33	32	...
Totals	27,520	21,601	10,394	11,086	70,601	16,723	6,833	1,031	22,420	47,007	4,098	121,706	458	607	24	64,678	22,952	1,543

received 29,723 patients. A classification by type of service shows that 37,124 tuberculous patients were admitted to general hospitals, 2,425 to tuberculosis services in nervous and mental institutions, 1,800 in departments of institutions, prisons and reformatories, 574 to orthopedic hospitals, 4,456 to institutions having combined tuberculosis and isolation services, and 628 patients to other types of hospitals.

Twenty-four preventoriums admitted 4,098 patients. This number does not include the children admitted to preventorium services in sanatoriums and tuberculosis departments. Five county preventoriums admitted 471 children, those under city and county control had 63 admissions, and seventeen private preventoriums admitted 3,564.

children and 43,085 not classified. According to table 6 there were 121,962 patients treated in the tuberculosis sanatoriums, 40,327 in tuberculosis departments, and 4,529 in the independently operated preventoriums. The sanatoriums treated 43,700 men, 34,736 women, 14,982 children and 28,544 unclassified patients, while 18,161 men, 6,202 women, 1,423 children and 14,541 patients not designated were treated in the tuberculosis departments of other hospitals.

3. *Patients Discharged.*—Table 7 shows 432 sanatoriums, 112 tuberculosis departments and eleven preventoriums which reported on the number of patients discharged during a twelve months period. All together, 555 institutions and 78,160 beds are represented: 82.1 per cent of the total capacity. The discharges includ-

ing deaths total 97,381: 39,754 men, 25,320 women, 12,113 children and 20,194 not classified. The sanatoriums, representing 63,228 beds, discharged 66,423 patients, including 25,054 men, 19,769 women, 9,718 children and 11,882 not designated. The tuberculosis departments show a more rapid turnover. There were 29,502 patients discharged in 112 departments representing 14,191 beds. An analysis shows that 14,700 were men, 5,551 women, 939 children and 8,312 not classified. Incomplete reports from the preventorium group show 1,456 children discharged.

4. *Average Daily Census of Patients.*—Five hundred and ninety-two tuberculosis institutions representing 83.8 per cent of the total bed capacity maintained an average daily census of 69,024 patients during the twelve months period covered by this report. In the sanatorium group, 460 institutions with a capacity of 64,829 beds had a daily average of 56,325 patients. Of the tuberculosis departments, 111 with a capacity of 13,748 beds reported an average daily census of 11,648,

Table 6.—Number of Patients Treated in Tuberculosis Institutions During Twelve Months Period
(According to Reports Received During 1934)

State	Sanatoriums					Departments					Preventoriums	Total Patients	Number of Institutions Reporting			Number of Beds Represented		
	Men	Women	Children	Unclassified	Total	Men	Women	Children	Unclassified	Total	Children	All Institutions	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums
Alabama	193	232	17	...	442	727	...	...	...	727	...	1,169	4	2	..	242	111	...
Arizona	356	195	145	443	1,139	927	...	...	224	1,151	...	2,290	14	2	..	643	325	...
Arkansas	508	578	229	...	1,315	...	...	...	63	63	...	1,378	2	1	..	556	22	...
California	2,312	2,342	364	1,719	6,737	2,210	581	187	3,211	6,189	776	13,702	30	20	8	3,628	2,268	418
Colorado	630	278	19	1,169	2,096	230	136	2	128	496	...	2,592	15	4	..	1,537	265	...
Connecticut	1,067	853	552	335	2,807	139	126	10	...	275	...	3,082	7	3	..	1,675	98	...
Delaware	60	69	36	68	233	...	...	...	...	...	35	268	2	..	1	161	...	22
District of Columbia	258	166	122	...	546	138	159	48	...	345	...	891	2	1	..	370	100	...
Florida	...	...	...	111	111	49	45	...	140	234	520	865	1	2	2	66	69	46
Georgia	18	20	...	1,420	1,458	...	...	...	...	...	40	1,498	5	..	1	645	...	13
Idaho	...	...	197	...	197	33	...	...	...	33	...	230	1	1	..	132	24	...
Illinois	2,288	1,992	1,338	1,154	6,772	580	...	...	1,929	2,509	...	9,281	25	3	..	3,467	802	...
Indiana	685	771	577	730	2,763	...	...	...	...	...	...	2,763	8	..	..	1,302	...	...
Iowa	413	561	30	320	1,324	...	...	...	...	...	...	1,324	6	..	..	774	...	...
Kansas	221	274	155	104	754	...	...	...	...	...	...	754	3	..	..	388	...	...
Kentucky	1,087	93	...	1,209	2,389	...	...	...	...	...	...	2,389	4	..	..	949	...	...
Louisiana	234	180	47	...	461	390	...	...	233	623	...	1,084	3	2	..	326	207	...
Maine	100	160	77	602	939	...	...	...	...	...	...	939	4	..	..	482	...	...
Maryland	721	506	120	1,808	3,155	...	...	...	...	...	...	3,155	8	..	..	1,350	...	...
Massachusetts	2,733	2,061	1,252	564	6,610	437	205	108	768	1,518	195	8,323	23	8	1	4,063	798	30
Michigan	2,312	1,876	616	691	5,495	655	151	16	2,573	3,395	...	8,890	22	6	..	3,329	1,164	...
Minnesota	1,119	1,141	269	656	3,185	609	155	15	464	1,243	107	4,535	15	5	1	1,940	492	80
Mississippi	...	...	99	619	718	...	...	...	...	...	...	718	2	..	..	527	...	...
Missouri	1,076	1,023	113	353	2,565	499	498	3	...	1,000	150	3,715	7	3	1	1,412	169	85
Montana	...	...	...	346	346	...	...	...	...	...	...	346	1	..	..	150	...	...
Nebraska	127	190	...	...	317	20	30	10	180	240	...	557	1	2	..	160	105	...
Nevada	...	...	...	...	...	...	...	...	...	...	...	...	..	..	..	...	...	...
New Hampshire	70	77	...	168	315	...	...	...	...	...	...	315	2	..	..	210	...	...
New Jersey	1,756	1,410	863	1,257	5,286	488	359	62	113	1,022	790	7,098	13	4	1	2,393	438	247
New Mexico	433	87	91	346	957	558	36	4	274	872	...	1,829	6	6	..	735	647	...
New York	8,914	5,579	3,115	2,804	20,412	5,873	2,529	436	2,840	11,678	870	32,960	56	14	2	9,620	2,653	182
North Carolina	2,762	934	218	275	4,189	...	...	...	...	...	...	4,189	12	..	..	2,021	...	...
North Dakota	142	204	82	...	428	...	...	...	49	49	...	477	1	1	..	265	14	...
Ohio	1,639	1,715	568	2,111	6,033	720	...	...	908	1,628	200	7,861	19	2	1	3,148	604	60
Oklahoma	1,088	928	131	111	2,258	...	...	...	...	...	...	2,258	6	..	..	888	...	...
Oregon	169	206	65	387	827	...	...	...	...	...	...	827	3	..	..	474	...	...
Pennsylvania	2,976	2,470	1,750	1,547	8,743	1,835	949	79	...	2,863	294	11,900	17	5	1	4,189	851	100
Rhode Island	439	389	43	...	871	141	62	...	...	203	251	1,325	2	1	1	495	60	50
South Carolina	132	139	111	450	832	9	38	12	78	137	...	969	5	2	..	469	120	...
South Dakota	178	220	...	...	398	142	...	...	...	142	...	540	1	1	..	192	90	...
Tennessee	426	420	238	780	1,864	...	...	...	...	...	79	1,943	7	..	1	1,124	...	50
Texas	1,689	1,797	699	527	4,712	120	67	...	50	237	...	4,949	14	3	..	1,736	127	...
Utah	...	...	...	...	...	34	20	...	...	54	...	54	..	1	..	...	32	...
Vermont	128	115	...	...	243	...	...	...	...	...	125	368	2	..	1	127	...	44
Virginia	161	175	95	1,915	2,346	39	42	7	...	88	...	2,434	7	1	..	1,123	52	...
Washington	167	232	46	885	1,330	232	14	424	316	986	...	2,316	9	3	..	751	686	...
West Virginia	433	608	129	271	1,441	...	...	...	...	...	...	1,441	7	..	..	772	...	...
Wisconsin	1,460	1,444	364	289	3,557	327	...	...	...	327	97	3,981	20	1	1	1,899	254	116
Wyoming	20	26	...	...	46	...	...	...	...	...	...	46	1	..	..	33	...	...
Totals	43,700	34,736	14,982	28,544	121,962	18,161	6,202	1,423	14,541	40,327	4,529	166,818	425	110	24	62,938	13,647	1,543

The deaths numbered 16,229, of which 10,923 occurred in the sanatoriums and 5,306 in the tuberculosis departments. Reports from the state departments of health and estimates based on provisional reports of the United States Census Bureau indicate that there were in 1933 approximately 74,564 deaths from all forms of tuberculosis and 67,371 from respiratory forms. From these figures it appears that only 21.7 per cent of the tuberculosis deaths occur in sanatoriums and hospitals operated for the treatment of tuberculosis. Since one of the main functions of tuberculosis institutions is to remove dangerous foci of infection from the community, it seems important that more of the far advanced terminal cases should be under institutional care.

According to the foregoing figures there were 20,558,625 treatment days in the tuberculosis sanatoriums, 4,251,520 in the tuberculosis departments and 383,615 in the preventoriums—a total of 25,193,760 treatment days in the 592 institutions that reported. Five hundred and sixty-three other institutions, mainly tuberculosis departments, reported a day's census of 12,910 patients. Accordingly, the tuberculosis institutions in the United States have an average daily census of approximately 81,952 patients and a total of 29,905,910 treatment days annually.

and twenty-one preventoriums representing 1,217 beds averaged 1,051 patients per day.

The average daily census of patients is shown by states in table 8 and according to institutional control in table 10. The latter table shows a daily average of 6,333 patients in the federal group, 51,178 in the other public institutions, and 11,513 in the sanatoriums, tuberculosis departments and preventoriums under private management.

5. *Census of Patients on Day of Reporting.*—The number of patients under treatment on the day of reporting will, of course, correspond closely to the figures reported in the preceding paragraph. Reports were received from 459 sanatoriums, 680 tuberculosis departments and sixteen preventoriums, representing 92,339 beds, or 97 per cent of the total capacity. These institutions indicated that at the time of their report 81,652 patients were receiving hospital treatment for tuberculosis: 27,229 men, 20,487 women, 8,079 children and 25,857 not classified. The sanatoriums were treating 56,579 patients, the tuberculosis departments 24,288, and the preventoriums 785.

The waiting list totaled 9,854 patients. There were 317 on the waiting lists of federal hospitals, 8,943 patients were awaiting admission to the other public institutions, and the private sanatoriums, tuberculosis departments and preventoriums had a waiting list of 594. At the same time there were 13,571 vacancies reported: 2,580 in federal hospitals, 5,436 in the remaining public institutions, and 5,555 in institutions under private control. Apparently, therefore, the waiting list was due to an unequal distribution in patient load.

Table 9, which represents a day's census of patients, shows 56,579 patients receiving treatment in the sana-

Table 7.—Number of Patients Discharged in Tuberculosis Institutions
(Twelve Months Period According to Reports Received During 1934)

	Sanatoriums					Departments					Preventoriums			Number of Institutions Reporting			Number of Beds Represented		
	Men	Women	Children	Unclassified	Total	Men	Women	Children	Unclassified	Total	Children	Patients Discharged Including Deaths	Deaths in Tuberculosis Institutions	Tuberculosis Deaths in United States—All Forms (1933)*	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums
Alabama	122	139	15	...	276	288	...	...	...	288	...	564	157	1,936	4	2	..	242	111	...
Arizona	204	131	90	276	701	629	...	...	189	818	...	1,519	168	1,075	14	2	..	643	325	...
Arkansas	338	320	113	...	771	...	...	...	30	30	...	801	72	1,071	2	1	..	556	22	...
California	1,139	1,089	371	831	3,430	2,000	710	121	1,532	4,363	217	8,010	1,298	4,619	30	20	3	3,628	2,268	155
Colorado	440	223	79	397	1,139	154	91	2	964	1,211	...	2,350	300	873	16	6	..	1,593	819	...
Connecticut	496	386	212	195	1,289	119	103	10	...	232	...	1,521	277	815	7	3	..	1,675	98	...
Delaware	26	24	10	33	93	...	...	...	...	...	...	93	31	179	2	..	..	161	...	...
Dist. Columbia	120	83	6	...	209	118	127	45	...	290	...	499	195	614	2	1	..	370	100	...
Florida	17	19	...	...	36	33	28	...	79	140	...	176	47	1,039	1	2	..	66	69	...
Georgia	10	15	182	703	910	...	...	...	...	...	28	938	109	1,782	5	..	1	645	...	13
Idaho	...	...	134	...	134	24	...	...	...	24	...	158	9	140	1	1	..	132	24	...
Illinois	1,313	1,104	1,202	334	3,953	476	...	...	1,404	1,880	...	5,833	1,360	4,173	25	3	..	3,467	802	...
Indiana	380	439	435	299	1,553	...	...	...	...	...	...	1,553	218	1,892	9	..	..	1,357	...	...
Iowa	215	237	23	166	641	...	...	...	...	...	...	641	128	654	6	..	..	774	...	...
Kansas	108	123	118	52	401	...	...	...	...	...	...	401	60	568	3	..	..	388	...	...
Kentucky	1,021	336	85	...	1,442	...	...	...	...	...	...	1,442	174	2,315	4	..	..	949	...	...
Louisiana	110	113	27	...	250	328	...	...	183	511	...	761	155	1,585	3	2	..	326	207	...
Maine	58	94	41	322	515	...	...	...	...	...	...	515	86	367	4	..	..	482	...	...
Maryland	823	632	169	233	1,857	...	...	...	...	...	...	1,857	432	1,384	8	..	..	1,350	...	...
Massachusetts	1,416	1,014	555	277	3,262	250	115	20	500	885	195	4,342	943	2,273	23	9	1	4,063	834	30
Michigan	1,085	861	339	394	2,679	562	99	10	1,734	2,405	...	5,084	857	2,348	22	6	..	3,329	1,164	...
Minnesota	555	540	81	240	1,416	416	124	12	183	735	26	2,177	391	996	16	5	1	1,960	492	80
Mississippi	...	...	65	308	373	...	...	...	...	...	...	373	43	1,378	2	..	..	527	...	...
Missouri	563	477	71	214	1,325	343	359	...	...	702	...	2,027	323	2,281	7	3	..	1,412	169	...
Montana	...	...	...	202	202	...	...	...	...	...	...	202	36	282	1	..	..	150	...	...
Nebraska	67	93	...	...	160	50	73	14	...	137	...	297	64	303	1	2	..	160	105	...
Nevada	...	...	...	...	...	...	...	...	...	...	...	...	...	87	..	..	..	...	...	...
New Hampshire	30	34	...	77	141	...	...	...	...	...	...	141	17	178	2	..	..	210	...	...
New Jersey	983	773	580	618	2,954	337	235	78	36	686	600	4,240	891	2,376	13	4	1	2,393	438	247
New Mexico	211	62	20	177	470	315	17	3	179	514	...	984	94	511	7	6	..	785	647	...
New York	4,939	3,181	1,854	1,617	11,591	5,541	2,470	290	699	9,000	48	20,639	3,341	7,909	57	14	1	9,650	2,653	22
N. Carolina	1,727	471	121	126	2,445	...	...	...	...	...	...	2,445	282	2,119	12	..	..	1,975	...	...
N. Dakota	52	83	39	...	174	14	25	...	...	39	...	213	32	167	1	1	..	265	14	...
Ohio	907	937	245	1,003	3,092	536	...	...	555	1,091	...	4,183	882	3,638	19	2	..	3,148	604	...
Oklahoma	438	591	85	27	1,141	...	...	...	...	...	...	1,141	126	1,210	6	..	..	888	...	...
Oregon	115	128	32	110	385	...	...	...	...	...	...	385	61	345	3	..	..	474	...	...
Pennsylvania	1,735	1,486	1,149	656	5,026	1,486	770	58	...	2,314	230	7,570	849	5,088	17	5	1	4,189	851	100
Rhode Island	200	170	42	...	412	96	44	...	...	140	...	552	128	353	2	1	..	495	60	...
S. Carolina	65	65	69	238	437	3	15	5	45	68	...	505	70	1,080	5	2	..	469	120	...
S. Dakota	45	48	...	...	93	96	...	...	...	96	...	189	36	285	1	1	..	192	90	...
Tennessee	296	289	175	204	964	...	...	...	...	...	31	995	262	2,589	7	..	1	1,124	...	50
Texas	1,273	1,396	466	254	3,389	67	35	...	...	102	...	3,491	341	4,302	16	2	..	1,861	81	...
Utah	...	...	...	...	...	23	13	...	...	36	...	36	12	93	..	1	..	...	32	...
Vermont	71	58	...	...	129	...	...	...	...	...	81	210	38	176	2	..	1	127	...	44
Virginia	198	264	53	777	1,292	32	30	5	...	67	...	1,359	213	2,034	7	1	..	1,123	52	...
Washington	233	221	64	212	730	171	68	266	...	505	...	1,235	142	857	9	3	..	751	686	...
West Virginia	221	360	53	132	766	...	...	...	...	...	...	766	100	938	7	..	..	772	...	...
Wisconsin	675	643	248	178	1,744	193	...	...	...	193	...	1,937	369	1,217	20	1	..	1,899	254	...
Wyoming	14	17	...	...	31	...	...	...	...	...	...	31	10	70	1	..	..	33	...	...
Totals	25,054	19,769	9,718	11,882	66,423	14,700	5,551	939	8,312	29,502	1,456	97,381	16,229	74,564	432	112	11	63,228	14,191	741

* Based on reports of State Departments of Health and provisional reports of the United States Census Bureau.

6. *Average Length of Stay.* — Five hundred and thirty-two tuberculosis institutions representing 74,881 beds furnished information regarding the average length of stay of the patients treated. There were 422

Table 8.—Average Daily Census of Patients in Tuberculosis Institutions During Twelve Months Period
(Based on Reports Received During 1934)

State	Number of Institutions Reporting				Number of Beds Represented			
	Sanatoriums	Departments	Preventoriums	Total	Sanatoriums	Departments	Preventoriums	
Alabama	162	110	...	272	4	2	..	242	111	...
Arizona	436	352	...	788	17	2	..	782	325	...
Arkansas	555	15	...	570	2	1	..	556	22	...
California	3,400	1,728	390	5,518	33	18	8	3,939	2,017	418
Colorado	1,033	648	...	1,681	17	5	..	1,743	809	...
Connecticut	1,487	84	...	1,571	7	3	..	1,675	98	...
Delaware	129	...	20	149	2	..	1	161	...	22
District of Columbia	285	63	...	348	2	1	..	370	100	...
Florida	60	61	44	165	1	2	2	66	69	46
Georgia	553	...	13	566	5	..	1	645	...	13
Idaho	114	15	...	129	1	1	..	132	24	...
Illinois	2,821	779	...	3,600	26	3	..	3,478	802	...
Indiana	1,182	...	...	1,182	9	..	..	1,357	...	...
Iowa	660	...	...	660	6	..	..	774	...	...
Kansas	354	...	...	354	3	..	..	388	...	...
Kentucky	914	...	...	914	4	..	..	949	...	...
Louisiana	198	145	...	343	3	2	..	326	207	...
Maine	443	16	...	459	4	1	..	482	16	...
Maryland	1,302	...	...	1,302	8	..	..	1,350	...	...
Massachusetts	3,497	466	29	3,992	23	8	1	4,063	554	30
Michigan	2,911	1,016	...	3,927	23	6	..	3,355	1,164	...
Minnesota	1,755	433	78	2,266	16	5	1	1,960	492	80
Mississippi	340	...	...	340	2	..	..	527	...	...
Missouri	1,274	144	50	1,468	7	3	1	1,412	169	85
Montana	137	...	...	137	1	..	..	150	...	...
Nebraska	154	93	...	247	1	2	..	160	105	...
Nevada	...	...	...	...	..	..	..	...	...	...
New Hampshire	176	...	...	176	2	..	..	210	...	...
New Jersey	2,303	363	175	2,841	14	4	1	2,420	438	247
New Mexico	577	280	...	857	8	6	..	870	647	...
New York	9,202	2,627	21	11,850	57	15	1	9,650	2,715	22
North Carolina	1,841	...	...	1,841	23	..	..	2,452	...	...
North Dakota	239	10	...	249	1	1	..	265	14	...
Ohio	2,912	537	60	3,509	21	3	1	3,214	624	60
Oklahoma	769	...	...	769	6	..	..	888	...	...
Oregon	468	...	...	468	4	..	..	513	...	...
Pennsylvania	3,808	706	80	4,594	17	5	1	4,189	851	100
Rhode Island	462	60	47	569	2	1	1	495	60	50
South Carolina	464	43	...	507	6	2	..	539	120	...
South Dakota	160	43	...	203	1	1	..	192	90	...
Tennessee	891	...	...	891	7	..	..	1,124	...	...
Texas	1,599	76	...	1,675	17	2	..	1,971	81	...
Utah	...	25	...	25	..	1	..	...	32	...
Vermont	113	...	44	157	2	..	1	127	...	44
Virginia	985	21	...	1,006	7	1	..	1,123	52	...
Washington	637	546	...	1,183	9	3	..	751	686	...
West Virginia	692	...	...	692	7	..	..	772	...	...
Wisconsin	1,843	143	...	1,986	21	1	..	1,989	254	...
Wyoming	28	...	...	28	1	..	..	33	...	...
Totals	56,325	11,648	1,051	69,024	460	111	21	64,829	13,748	1,217

sanatoriums with a capacity of 61,234 beds which reported 118,008 patients treated and a total of 19,643,640 treatment days. This indicates an average length of stay of 166 days per patient, a figure similar to that reported by Drolet but somewhat lower than the average reported by the National Tuberculosis Association following its survey of 1931.

According to the accompanying tabulation the federal sanatoriums have an average length of stay of 172 days, the state sanatoriums 166, those operated by counties average 173, municipal sanatoriums 170 days, the sanatoriums operated jointly under city and county management average 165, and, as might be expected, the sanatoriums under private control show the lowest average length of stay, 151 days.

Average Length of Stay

Control	No. of Sanatoriums Reporting	No. of Beds Represented	No. of Patients Treated	No. of Treatment Days	Average Length of Stay
Federal	15	2,399	3,765	647,580	172
State	62	17,508	34,623	5,751,280	166
County	163	19,732	38,000	6,589,700	173
City	21	7,317	15,403	2,621,890	170
City-county	15	2,423	5,113	842,725	165
Private	146	12,055	21,104	3,190,465	151
Totals	422	61,234	118,008	19,643,640	166

In 261 state and local public sanatoriums, representing 46,780 beds, 93,139 patients treated and 15,805,595 treatment days, the average length of stay is 170 days. This group of institutions shows the following averages by states:

Average Length of Stay, Shown by States

Alabama	133	Montana	144
Arizona	154	Nebraska	177
Arkansas	155	New Hampshire	223
California	193	New Jersey	159
Connecticut	203	New York	163
Delaware	202	North Carolina	168
District of Columbia	190	North Dakota	204
Florida	197	Ohio	174
Georgia	138	Oklahoma	119
Illinois	155	Oregon	214
Indiana	152	Pennsylvania	170
Iowa	177	Rhode Island	191
Kansas	171	South Carolina	177
Kentucky	169	South Dakota	147
Louisiana	180	Tennessee	177
Maine	175	Texas	105
Maryland	147	Vermont	170
Massachusetts	194	Virginia	160
Michigan	197	Washington	196
Minnesota	202	West Virginia	171
Mississippi	174	Wisconsin	180
Missouri	188	Wyoming	222

In 110 tuberculosis departments representing 13,647 beds there were 40,327 patients treated and 4,073,027 hospital days. This indicates that the average length of stay for the whole group is 101 days. These institutions represent mainly the larger departments, however, which resemble the regular sanatoriums in organization and function. Eighty-one tuberculosis departments in general hospitals showed an average length of stay of ninety-two days. No information is

available regarding the length of stay in the other 337 departments of general hospitals except what inference can be made from the fact that they admitted 14,197 patients during a twelve months period and had 3,095 patients remaining on the day of reporting.

7. *Condition of Patients on Admission.*—Four hundred and ninety-four institutions, representing 73,335 beds, reported on the condition of patients on admission. All together, 89,237 patients are included in this study, as shown in table 11. The reports indicate that 76,797, or 86.1 per cent of the patients, were tuberculous, 8,140, or 9.1 per cent, were diagnosed as nontuberculous, and 4,300, or 4.8 per cent, were unclassified.

Of the tuberculous patients, 87 per cent were pulmonary cases, 8.7 per cent childhood type, and 4.3 per cent nonpulmonary forms. These figures correspond closely to the rates of 88, 8 and 4 per cent obtained by the National Tuberculosis Association in its survey of 1931.

In the group of frank pulmonary tuberculosis, 66,861 patients in all, it was found that 13.1 per cent were admitted in the minimal stage, 29.7 per cent as moderately advanced, and 57.2 per cent as far advanced. The findings of the National Tuberculosis Association in 1931 were 16, 30 and 54 per cent respectively, and in 1926 Drolet reported 16, 34 and 50 per cent. The gradual increase in the admission rate of far advanced cases and the corresponding decrease in the minimal classification may not be alarming in any way but merely indicative of increased facilities for the isolation and treatment of far advanced, infectious cases of pulmonary tuberculosis.

8. *Condition of Patients on Discharge.*—Reports on the condition of patients on discharge were received from 507 institutions representing 74,650 beds. The results obtained are listed by states in table 12 and are classified according to adult and childhood type.

Of the 67,021 patients listed under the adult type classification, 7.5 per cent were discharged as "arrested," 9.8 per cent "apparently arrested," 11.6 per cent quiescent," 30 per cent "improved," 17.2 per cent "unimproved," and 23.9 per cent died. A favorable result was obtained, therefore, in 58.9 per cent of the cases. These figures are practically identical with the report of the National Tuberculosis Association in 1931, when 17 per cent were listed as "apparently arrested" (includes "arrested" cases), 41 per cent "quiescent and improved," 19 per cent "unimproved or progressive," and 23 per cent died.

The childhood group with reports on 8,164 patients showed, of course, a much higher rate of successful

Table 9.—Census of Patients in Tuberculosis Institutions on Day of Reporting

State	Sanatoriums					Departments					Preventoriums			Number of Institutions Reporting			Number of Beds Represented		
	Men	Women	Children	Unclassified	Total	Men	Women	Children	Unclassified	Total	Children	Total Number of Patients	Number on Waiting List	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums
Alabama	68	93	14	...	175	61	...	..	91	152	..	327	62	4	8	..	242	220	..
Arizona	156	90	60	219	525	342	...	..	131	473	6	1,004	13	18	15	1	805	403	10
Arkansas	203	275	86	...	564	5	9	..	75	89	..	653	171	2	6	..	556	134	..
California	1,161	1,231	139	897	3,428	937	376	89	1,081	2,483	126	6,037	220	35	50	3	3,996	2,951	155
Colorado	373	220	2	439	1,034	62	50	..	673	785	..	1,819	130	17	16	..	1,743	938	..
Connecticut	572	466	322	140	1,500	30	36	..	108	174	..	1,674	164	7	5	..	1,675	144	..
Delaware	53	52	34	...	139	...	...	..	13	13	..	152	60	2	1	..	161	...	..
District of Columbia	142	79	134	...	355	41	35	6	128	210	..	565	30	2	7	..	370	296	..
Florida	...	...	1	72	73	16	17	..	143	176	..	249	22	3	13	..	86	198	..
Georgia	20	21	5	515	561	...	...	..	535	535	13	1,109	752	5	7	1	645	552	13
Idaho	...	...	131	...	131	12	...	..	28	40	..	171	...	1	7	..	132	84	..
Illinois	1,075	1,135	269	434	2,913	505	275	25	1,217	2,022	..	4,935	228	26	31	..	3,478	1,870	..
Indiana	382	439	264	166	1,251	...	...	..	150	150	..	1,401	271	9	10	..	1,357	175	..
Iowa	216	319	13	157	705	...	...	..	271	271	..	976	83	6	12	..	774	207	..
Kansas	122	146	39	41	348	...	...	..	194	194	..	542	94	3	14	..	388	183	..
Kentucky	505	304	139	...	948	...	...	..	129	129	..	1,077	1,788	4	6	..	949	229	..
Louisiana	80	83	27	...	190	91	...	..	285	376	..	566	89	3	5	..	326	406	..
Maine	153	198	74	...	425	...	...	..	73	73	..	498	21	4	8	..	482	70	..
Maryland	269	208	83	756	1,316	...	...	..	221	221	..	1,537	139	8	8	..	1,350	193	..
Massachusetts	1,488	1,136	667	234	3,525	251	141	96	639	1,127	27	4,679	186	23	32	1	4,063	1,237	30
Michigan	1,192	906	304	462	2,864	87	53	5	1,244	1,389	20	4,273	170	23	22	1	3,355	1,560	20
Minnesota	688	682	86	289	1,745	187	14	3	538	742	82	2,569	80	16	19	1	1,960	792	80
Mississippi	...	...	34	311	345	...	...	..	241	241	..	586	...	2	3	..	527	245	..
Missouri	544	604	47	145	1,340	52	98	3	424	577	..	1,917	236	7	19	..	1,412	544	..
Montana	...	...	...	136	136	...	...	..	54	54	..	190	56	1	7	..	150	110	..
Nebraska	63	94	...	...	157	42	48	2	29	121	..	278	41	1	7	..	160	144	..
Nevada	...	...	...	...	...	...	...	..	15	15	..	15	...	..	4	..	...	18	..
New Hampshire	76	80	22	...	178	...	...	..	18	18	..	196	3	2	3	..	210	20	..
New Jersey	846	651	329	436	2,262	150	119	64	485	818	190	3,270	177	14	19	1	2,423	876	247
New Mexico	260	45	71	221	597	209	18	1	133	361	..	958	40	8	15	..	870	683	..
New York	4,332	2,578	1,207	617	8,734	1,262	609	137	2,473	4,481	34	13,249	428	57	68	2	9,650	4,412	42
North Carolina	1,033	474	115	195	1,817	...	...	..	72	72	..	1,889	251	20	8	..	2,384	123	..
North Dakota	87	119	43	...	249	3	4	..	23	30	..	279	97	1	8	..	265	76	..
Ohio	795	864	339	1,020	3,018	359	171	..	650	1,180	..	4,198	427	20	34	..	3,166	1,360	..
Oklahoma	322	357	112	...	791	...	...	..	131	131	..	922	407	6	13	..	888	158	..
Oregon	179	191	33	38	441	...	...	..	169	169	..	610	90	3	8	..	474	109	..
Pennsylvania	1,607	1,431	610	238	3,886	482	199	21	895	1,597	70	5,553	1,315	17	51	1	4,189	1,764	100
Rhode Island	208	179	48	...	435	41	12	..	101	154	31	620	9	2	6	1	495	60	50
South Carolina	57	75	44	211	387	3	8	2	130	143	..	530	288	5	6	..	469	136	..
South Dakota	96	109	...	...	205	46	...	..	15	61	..	266	38	1	4	..	192	105	..
Tennessee	206	221	114	346	887	...	...	..	272	272	50	1,209	174	7	10	1	1,124	398	50
Texas	527	506	241	383	1,657	47	32	..	605	684	..	2,341	408	17	25	..	1,971	894	..
Utah	...	...	...	...	...	19	12	..	19	50	..	50	...	..	5	..	...	54	..
Vermont	58	58	...	...	116	...	...	..	1	1	44	161	34	2	1	1	127	...	44
Virginia	113	112	56	721	1,002	8	3	2	214	227	..	1,229	172	7	9	..	1,123	302	..
Washington	150	155	38	288	631	202	104	244	103	653	..	1,284	157	9	18	..	751	780	..
West Virginia	292	285	73	68	718	...	...	..	84	84	..	802	133	7	7	..	772	77	..
Wisconsin	761	757	125	203	1,846	134	...	..	126	260	92	2,198	100	21	17	1	1,989	370	116
Wyoming	13	16	...	...	29	...	...	..	10	10	..	39	...	1	3	..	33	15	..
Totals	21,543	18,044	6,504	10,398	56,579	5,686	2,443	700	15,459	24,288	785	81,652	9,854	459	680	16	64,707	26,675	957

treatment, 93.3 per cent. There were 27.9 per cent "apparently healed," 12.5 per cent "inactive," 52.9 per cent "improved," 4.4 per cent "unimproved," and 2.3 per cent died.

culosis departments, and 1,667 in the preventoriums. The federal sanatoriums have 328 children's beds, the state sanatoriums have 3,170, those under county control have 3,165, the municipal sanatoriums have

Table 10.—Patient Population on the Basis of Institutional Control

	Federal		State		County			City		City-County			Private			Total			Grand Total, All Institutions	Number of Beds Represented, All Institutions
	Sanatoriums	Departments	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums	Sanatoriums	Departments	Preventoriums		
Admissions..	5,078	10,445	19,028	4,351	20,845	6,634	471	8,346	17,304	2,824	1,434	63	14,480	6,839	3,564	70,601	47,007	4,098	121,706	89,173
Patients treated....	7,719	7,497	34,623	1,793	38,000	7,444	495	15,403	18,299	5,113	1,877	186	21,104	3,417	3,848	121,962	40,327	4,529	166,818	78,128
Discharges (including deaths)....	4,617	5,789	18,406	1,335	19,827	5,157	184	8,307	13,767	2,813	1,141	57	12,453	2,313	1,215	66,423	29,502	1,456	97,381	78,160
Number of deaths.....	590	889	2,116	170	4,017	1,677	...	1,716	2,103	573	102	..	1,911	365	...	10,923	5,306	.....	16,229	74,099
Daily average.....	3,179	3,154	15,756	287	18,364	2,090	184	7,227	4,218	2,309	665	78	9,490	1,234	789	56,325	11,648	1,051	69,024	79,794
Patients present.....	3,442	4,933	15,947	8,726	18,440	3,165	190	7,014	4,538	2,316	698	132	9,420	2,228	463	56,579	24,288	785	81,652	92,339
Vacancies....	676	1,904	1,361	1,066	1,674	386	174	351	.....	107	317	..	4,264	581	710	8,433	4,254	884	13,571	.....
Patients on waiting list	150	167	6,108	12	1,637	294	12	228	228	392	4	28	476	67	51	8,991	772	91	9,854	.....

Table 11.—Condition of Patients on Admission
(Sanatoriums and Tuberculosis Departments)

State	Number of Institutions Reporting	Number of Beds Represented	Tuberculous Patients						Non-Tuberculous		Not Classified		Total, All Patients
			Pulmonary			Childhood	Non-pulmonary Forms	Total	Adults	Children	Adults	Children	
			Minimal	Moderately Advanced	Far Advanced								
Alabama	4	249	26	96	153	...	3	278	14	14	...	...	306
Arizona	13	732	61	213	659	13	30	976	255	...	16	101	1,348
Arkansas	3	578	36	87	804	228	2	1,157	...	...	140	...	1,297
California	45	5,718	833	1,591	2,549	467	637	6,077	115	38	125	13	6,368
Colorado	16	1,602	83	162	780	21	17	1,063	74	29	63	3	1,232
Connecticut	10	1,773	104	326	718	71	47	1,266	142	32	53	7	1,500
Delaware	2	161	9	22	54	16	6	107	...	2	2	...	111
District of Columbia	3	470	36	71	113	128	35	383	...	...	317	...	700
Florida	2	103	2	79	42	...	2	125	2	...	...	...	127
Georgia	3	579	46	163	397	146	60	812	62	35	17	...	926
Idaho	2	156	59	16	9	52	7	143	...	13	...	1	157
Illinois	27	4,209	472	975	2,857	205	167	4,676	209	1,038	253	72	6,248
Indiana	9	1,357	264	199	507	509	29	1,508	31	376	76	11	2,002
Iowa	6	774	61	209	287	43	24	624	18	20	6	10	678
Kansas	2	328	56	119	210	41	36	462	63	127	7	1	660
Kentucky	4	949	33	241	562	114	63	1,013	238	5	18	...	1,274
Louisiana	5	533	128	253	262	19	136	798	32	1	141	...	972
Maine	4	482	33	91	208	60	20	412	47	6	46	8	519
Maryland	7	1,295	268	451	862	180	15	1,776	76	10	22	66	1,950
Massachusetts	30	4,807	371	1,257	2,400	269	245	4,542	155	46	113	12	4,868
Michigan	27	4,493	506	1,144	2,412	262	254	4,578	568	20	171	9	5,346
Minnesota	20	2,432	181	512	1,114	20	116	1,943	159	3	81	27	2,213
Mississippi	2	527	52	88	66	...	4	210	41	...	51	65	367
Missouri	9	1,519	113	519	1,112	60	16	1,820	72	42	20	7	1,961
Montana	1	150	31	58	47	28	6	170	6	...	20	...	196
Nebraska	3	265	62	86	158	32	7	345	4	...	...	4	353
Nevada	..	...	...	...	...	...	...	...	...	...	...	...	...
New Hampshire	2	210	24	24	86	19	1	154	2	...	...	...	156
New Jersey	15	2,663	326	1,055	1,658	466	34	3,539	157	52	33	32	3,813
New Mexico	8	1,037	86	176	326	45	33	666	28	1	18	...	713
New York	65	11,215	1,481	2,981	6,847	649	617	12,575	1,169	712	524	174	15,154
North Carolina	10	1,865	184	551	823	105	40	1,703	324	10	348	9	2,394
North Dakota	2	279	29	62	102	72	12	277	4	4	14	...	299
Ohio	20	3,696	787	868	2,078	509	166	4,408	162	34	244	12	4,860
Oklahoma	6	888	206	312	473	125	1	1,117	100	1	51	...	1,269
Oregon	2	409	35	71	136	26	1	269	20	6	5	...	300
Pennsylvania	18	4,659	481	1,176	1,996	336	85	4,074	125	322	301	40	4,862
Rhode Island	3	555	71	143	235	5	43	497	38	1	27	1	564
South Carolina	7	589	68	87	201	53	7	416	45	9	8	9	487
South Dakota	2	282	8	64	78	...	3	153	20	...	4	...	177
Tennessee	6	1,112	68	220	264	168	14	734	9	25	...	...	768
Texas	18	1,948	305	1,601	1,158	474	12	3,550	33	11	4	...	3,598
Utah	1	32	6	17	32	...	...	55	...	...	9	...	64
Vermont	2	127	14	35	61	...	2	112	9	...	15	...	136
Virginia	8	1,175	108	216	673	74	4	1,075	56	59	109	...	1,299
Washington	12	1,437	152	304	435	352	57	1,300	47	83	1	...	1,431
West Virginia	7	772	133	203	281	48	28	693	97	20	1	4	815
Wisconsin	20	2,111	234	690	987	149	132	2,142	69	29	125	3	2,368
Wyoming	1	33	3	4	16	...	1	24	7	...	...	...	31
Totals	494	73,335	8,735	19,888	38,238	6,659	3,277	76,797	4,904	3,236	3,599	701	89,237

The results obtained in the treatment of extrapulmonary tuberculosis are included in the foregoing classifications. No figures were available for a separate listing.

HOSPITALIZATION OF CHILDREN

There are in the tuberculosis institutions 11,647 beds for children: 9,036 in the sanatoriums, 944 in the tuber-

1,001, those operated jointly under city and county management have 480 beds, and the privately owned sanatoriums have 892. All together, 230 sanatoriums, thirty of the principal tuberculosis departments, and twenty-nine preventoriums admit children. The replies to the questionnaire indicate that in addition to the preventoriums there are 161 sanatoriums and fifteen

tuberculosis departments which accept childhood tuberculosis, contacts and other nontuberculous children. One hundred and twenty of the sanatoriums that admit childhood tuberculosis also receive children with pulmonary tuberculosis of the adult type.

Many of the sanatoriums admitting children have a waiting list for adults. This creates a problem worthy of special consideration by those in charge of tuberculosis institutions, for in the crusade against tuberculosis it seems more important to remove dangerous foci of infection from the community than to seek prevention through the hospitalization of nontuberculous units there may be need for individual segregation, for sixteen of the twenty-nine preventoriums reported 2,479 patients admitted, of whom twelve were adult type tuberculosis, 424 childhood type, twenty-four had extrapulmonary lesions, 1,326 were nontuberculous, and 693 unclassified.

Four tuberculosis departments and 120 sanatoriums have separate buildings for children. In others, the children are segregated in wards or separate rooms but may be in close proximity to the adult patients. Although by far the majority of sanatoriums provide adequate segregation, there are some in which the

Table 12.—Condition of Patients on Discharge
(Sanatoriums and Tuberculosis Departments)

State	Number of Institutions Reporting	Number of Beds Represented	Adult Type							Childhood Type						Nontuberculous	Not Classified	Total Patients Represented
			Arrested	Apparently Arrested	Quiescent	Improved	Unimproved	Died	Total	Apparently Healed	Inactive	Improved	Unimproved	Died	Total			
Alabama	6	353	13	36	51	65	37	157	359	...	...	7	..	..	7	7	12	385
Arizona	15	1,083	90	15	13	279	348	166	911	...	...	12	6	2	20	201	25	1,157
Arkansas	3	578	132	30	94	129	122	71	578	99	...	12	1	1	113	143	...	834
California	42	5,180	577	502	692	1,193	933	1,294	5,191	97	67	90	8	4	266	219	78	5,754
Colorado	18	2,194	37	102	147	268	136	298	988	1	1	71	2	2	77	81	58	1,204
Connecticut	10	1,773	35	70	127	502	176	261	1,171	53	...	135	17	16	221	77	36	1,505
Delaware	2	161	1	5	...	28	14	30	78	...	...	5	..	1	6	4	5	93
District of Columbia	3	470	...	21	...	156	140	195	512	...	...	5	..	..	5	...	...	517
Florida	2	103	5	18	...	33	10	47	113	...	...	...	..	..	...	2	...	115
Georgia	3	579	38	147	105	240	53	109	692	54	9	2	..	..	65	51	...	808
Idaho	2	156	8	1	...	32	3	7	51	25	4	73	5	2	109	3	...	163
Illinois	26	4,209	287	511	590	1,112	498	1,358	4,356	30	44	673	6	2	755	342	357	5,810
Indiana	9	1,357	17	293	129	179	149	214	981	276	45	105	18	4	448	46	14	1,489
Iowa	6	774	35	116	54	148	45	126	524	17	...	53	7	2	79	12	...	615
Kansas	3	388	3	12	20	219	143	60	457	8	...	22	5	..	35	137	...	629
Kentucky	4	949	65	67	63	298	242	174	909	40	14	25	1	..	80	225	228	1,442
Louisiana	5	533	26	27	27	144	51	155	430	7	21	...	..	..	28	53	...	511
Maine	5	498	2	55	51	161	75	85	429	15	...	16	4	1	36	40	...	505
Maryland	8	1,350	29	81	280	457	337	421	1,605	88	66	65	14	11	244	89	17	1,955
Massachusetts	31	4,843	383	331	594	746	387	939	3,380	91	5	33	6	4	139	136	216	3,871
Michigan	27	4,493	155	456	396	1,774	654	845	4,280	237	38	38	18	12	343	554	87	5,264
Minnesota	20	2,432	229	163	292	522	305	387	1,898	30	7	36	3	4	80	158	13	2,149
Mississippi	2	527	18	15	35	91	37	43	239	...	...	65	..	..	65	67	...	371
Missouri	8	1,479	115	39	148	454	208	323	1,287	12	16	43	..	..	71	55	...	1,413
Montana	1	150	46	...	24	47	22	36	175	...	...	...	..	..	...	27	...	202
Nebraska	3	265	41	24	30	56	36	59	246	...	...	5	4	5	14	5	22	287
Nevada	..	...	...	...	...	...	...	...	...	...	...	...	..	..	...	...	...	...
New Hampshire	2	210	14	10	18	51	14	17	124	...	...	...	..	..	...	...	17	141
New Jersey	17	2,831	110	296	409	830	585	889	3,119	102	13	372	8	2	497	213	29	3,858
New Mexico	10	1,096	62	45	59	170	155	94	585	9	...	3	..	..	12	32	33	662
New York	69	11,676	1,155	928	834	3,752	2,246	3,265	12,180	420	147	569	110	76	1,322	490	392	14,393
North Carolina	12	1,987	64	204	274	510	385	282	1,719	57	40	18	1	..	116	477	...	2,312
North Dakota	2	279	36	31	9	48	15	31	170	1	30	4	..	1	36	4	4	214
Ohio	20	3,696	373	511	533	626	653	871	3,567	52	39	175	26	11	303	236	30	4,136
Oklahoma	6	888	26	190	107	262	191	126	902	46	4	29	1	..	80	113	46	1,141
Oregon	2	409	49	20	31	49	23	61	233	8	6	4	1	..	19	23	...	275
Pennsylvania	16	4,154	177	168	437	1,127	786	833	3,528	41	352	968	52	16	1,429	202	22	5,181
Rhode Island	3	555	40	52	23	120	101	127	463	15	3	8	2	1	29	38	...	530
South Carolina	7	589	20	40	30	220	91	70	471	7	3	2	..	..	12	15	...	498
South Dakota	2	282	18	7	7	74	23	36	165	...	...	...	..	..	...	24	...	189
Tennessee	6	1,112	113	63	45	109	90	262	682	129	25	52	9	..	215	23	1	921
Texas	20	2,491	83	237	524	1,463	274	341	2,922	119	4	332	1	..	456	33	192	3,603
Utah	1	32	6	3	...	6	9	12	36	...	...	...	..	..	...	...	...	36
Vermont	2	127	...	3	18	13	32	38	104	1	...	...	..	..	1	24	...	129
Virginia	7	1,111	37	31	162	463	109	213	1,015	3	...	44	3	..	50	12	11	1,088
Washington	10	1,242	50	170	139	254	137	139	889	49	15	130	10	3	207	45	...	1,141
West Virginia	7	772	5	148	9	250	168	98	678	17	...	7	..	2	26	62	...	766
Wisconsin	21	2,201	174	254	127	386	289	366	1,596	19	2	16	8	3	48	156	...	1,800
Wyoming	1	33	3	2	...	14	4	10	33	...	...	...	..	..	...	...	...	33
Totals	507	74,650	5,002	6,550	7,757	20,130	11,541	16,041	67,021	2,275	1,020	4,324	357	188	8,164	4,965	1,945	82,095

children. It is generally conceded that the important feature, from an epidemiologic point of view, is the isolation of tuberculous patients who give off tubercle bacilli. Hence, many institutions aim to make adequate provisions for the care of adults and children with open parenchymal lesions before they attempt the hospitalization of other children as a secondary preventive measure.

Every one will agree that adequate isolation facilities are essential in institutions which admit both tuberculous and nontuberculous patients. Even in the independently operated preventoriums which are separate adults and children come in contact during meals, in their walks to and from wards, on the sanatorium grounds, at entertainments, and through the simultaneous use of solariums. In a few sanatoriums it was observed that children with pulmonary tuberculosis were hospitalized together with other children in the preventorium unit. The need for isolation facilities in the tuberculosis sanatoriums is apparent when one considers that, of the 12,629 children admitted, 1,191 had adult type tuberculosis, 6,659 the childhood type, 824 had extrapulmonary lesions, 3,236 were nontuberculous, and 701 were unclassified.

The use of sanatorium facilities for nontuberculous children is, of course, a secondary development, for the sanatoriums were originally established for the isolation and treatment of tuberculous patients. No one will deny the value of hospital care for undernourished and run-down children, but is it not first of all the duty of the sanatoriums to provide for the care of tuberculous patients awaiting hospitalization? Furthermore, since one of the main functions of the tuberculosis sanatoriums is segregation, is it consistent, from an epidemiologic point of view, to place nontuberculous children in the same institution in which there are open cases of pulmonary tuberculosis?

Table 13.—Number of Physicians in Tuberculosis Sanatoriums

Control	Number of Sanatoriums	Number of Beds	Average Daily Census	Medical Director: Full-time	Medical Director: Part-time	Other Physicians: Full-time	Other Physicians: Attending or Consulting	Total, All Physicians
Federal	18	4,103	3,179	18	..	83	27	128
State	65	17,308	15,756	61	4	187	151	403
County	173	20,114	18,364	106	67	187	813	1,173
City	22	7,365	7,227	12	10	80	221	323
City-county	15	2,423	2,309	8	7	24	64	103
Private	178	13,684	9,490	68	90	142	919	1,219
Totals	471	64,997	56,325	273	178	703	2,195	3,349

A ratio of 1:52. The ratio of full-time physicians to patients is 1:63 in the state sanatoriums, 1:62 in the county institutions, 1:78 in the municipal sanatoriums, 1:72 in those under city and county control, and 1:45 in the privately owned sanatoriums. By including the part-time medical directors who are regular members of the staff, the ratios in the civilian sanatoriums become 1:62, 1:51, 1:70, 1:60 and 1:32 respectively. The sanatoriums as a group have a ratio of one physician to fifty-eight patients. With the part-time medical directors included, the ratio is 1:49.

Of the tuberculosis sanatoriums, 318 have a full-time medical staff, 120 sanatoriums have one physician on full-time duty, sixty-six have two, forty-four have three, and in eighty-eight institutions there are more than three physicians on full-time employment. Resident pathologists are employed in eleven sanatoriums, and resident roentgenologists in eight.

The table entitled "Medical Staff" is included to show the number of sanatoriums, the average bed capacity, the number of regular staff members, and the number of physicians per institution.

Some of the tuberculosis departments of hospitals have a full-time medical staff, but more commonly the staff physicians share in other hospital duties as well.

Table 14—Number of Nonmedical Personnel in Tuberculosis Sanatoriums

Control	Number of Sanatoriums	Average Daily Census	Number of Nurses: Graduate	Number of Nurses: Student	Number of Nurses: Affiliate	Number of Nurses: Practical	Number of Nurses: Total	Dietitians	Graduate Pharmacists	Record Clerks	X-Ray Technicians	Laboratory Technicians	Occupational Therapists	School Teachers	Social Service Workers	Field Nurses	Domestics	Others	Total
Veterans Bureau	6	2,232	259	...	...	8	267	14	6	13	7	10	19	3	1	...	260	1,086	1,686
Indian Administration	11	730	61	...	...	1	62	2	1	8	6	6	5	10	2	2	72	71	247
U. S. P. H. S.	1	217	10	...	...	...	10	2	1	1	1	1	2	1	1	...	17	109	146
State	65	15,756	917	308	6	615	1,846	50	7	113	65	79	20	75	11	25	1,532	3,019	6,842
County	173	18,364	1,499	126	66	867	2,558	81	7	145	104	119	54	118	44	98	1,958	2,798	8,084
City	22	7,227	629	...	18	398	1,045	24	8	29	14	27	14	15	8	160	552	2,024	3,920
City-county	15	2,309	123	...	...	135	258	10	1	8	9	10	2	15	3	9	294	404	1,023
Private	178	9,490	760	104	50	412	1,324	74	23	110	84	90	28	32	19	11	1,484	1,288	4,567
Totals	471	56,325	4,258	538	140	2,436	7,370	257	54	427	290	342	144	269	89	305	6,169	10,799	26,515

MEDICAL STAFF

The quality of medical service depends on the competence of the medical staff. For this reason it is essential that the medical personnel be selected on the basis of training and experience. Especially is it necessary that medical superintendents or directors should be well qualified in the specialty of tuberculosis, for they are responsible for the welfare of the sanatorium patients, for medical policies, and for the supervision and training of the younger members of the staff.

All together, 3,349 physicians are officially connected with the tuberculosis sanatoriums, as shown in table 13. There are 976 physicians on full-time duty, including 273 medical directors. In addition, 178 medical directors serve on a part-time basis, and 2,195 physicians are listed as members of the attending or consulting staff.

The eighteen federal sanatoriums with an average daily census of 3,179 patients have a full-time staff of 101 physicians, a ratio of one physician to thirty-one patients. Eleven Indian sanatoriums included in this group have fourteen physicians and 730 patients, In the independently operated preventoriums the medical service is mainly on a part-time basis, but the preventoriums that are part of a sanatorium system may have physicians assigned for part or full-time service.

NONMEDICAL PERSONNEL

According to table 14, which classifies the nonmedical personnel, there is a total of 26,515 employees in the tuberculosis sanatoriums, exclusive of physicians and dentists. For the care of patients the sanatoriums have a nursing staff of 7,370, exclusive of attendants. Of this number 4,258 are listed as graduates, 538 as student nurses, 140 as affiliates from other hospitals, and

Medical Staff

Control	Number of Sanatoriums	Average Bed Capacity	Regular Staff Members	Number of Physicians per Institution
Veterans	6	490	81	13.5
Indian	11	81	14	1.3
Public Health	1	270	6	6
Total federal	18	228	101	5.6
State	65	266	252	4
County	173	116	360	2
City	22	335	102	4.6
City-county	15	161	39	2.6
Private	178	77	300	1.7
Totals	471	138	1,154	2.4

2,436 as practical nurses. The ratio of nurses to patients can be computed for the various classes of sanatoriums by reference to table 14, and the ratio for individual institutions can be ascertained from the state lists of tuberculosis sanatoriums.

Personnel of Civilian Sanatoriums

Control	Number of Sanatoriums	Number of Civilian Sanatoriums Employing: Graduate Nurses	Practical Nurses	Laboratory Technicians	X-Ray Technicians	Dietitians	Graduate Pharmacists	Record Clerks	Occupational Therapists	School Teachers	Social Service Workers	Field Nurses
State	65	61	41	50	53	40	7	44	19	34	8	2
County	173	167	128	100	95	71	7	97	52	75	27	65
City	22	22	13	11	11	13	7	16	10	7	6	5
City-county	15	14	12	7	8	8	1	6	2	8	3	1
Private	178	161	94	78	78	64	21	77	24	27	15	5
Totals	453	425	288	246	245	196	43	240	107	151	59	78

Trained personnel for other sanatorium departments include 257 dietitians, fifty-four graduate pharmacists, 427 record clerks, 290 x-ray technicians, 342 laboratory technicians, 144 occupational therapists, 269 school teachers, eighty-nine social service workers and 305 field nurses. . In their community service many sanatoriums are aided by trained employees of local health units, so that the number of social workers and field nurses given does not represent the total personnel available for field service.

The tabulation that appears above shows the number of civilian sanatoriums that employ trained personnel for various services. This indicates that laboratory technicians are employed in 246 sanatoriums, x-ray technicians in 245, dietitians in 196, graduate pharmacists in forty-three, record clerks in 240 institutions, occupational therapists in 107, school teachers in 151, social service workers in fifty-nine, and field nurses in seventy-eight.

An analysis of the employed personnel in tuberculosis departments of hospitals has not been made because of the difficulty in making proportionate allowances where services overlap. It is apparent, however, that in most of the tuberculosis departments the personnel can be augmented whenever necessary by the transfer of employees from other hospital services.

HEALTH SERVICE FOR EMPLOYEES

The potential danger of transmission of infection is of paramount importance in the tuberculosis institutions both from an economic and a medical point of view. It seems essential, therefore, that the tuberculosis hospitals should institute periodic physical and roentgen examinations, not only to safeguard the health of employees but to guard against the employment of persons unfit for hospital service.

The present survey indicates that the sanatorium field is realizing more and more its responsibility with regard to health maintenance. Three hundred and eighty-five sanatoriums and ninety-three of the principal tuberculosis departments gave information about the health service for employees. Of the sanatoriums, 257 require a physical examination, 100 make a physical examination "when necessary," 218 require a roentgenogram of the chest, 102 make a roentgenogram "if indicated," and 123 include the tuberculin test. In fifty-three the physical examination is held only at the beginning of the service, whereas in 198 sanatoriums the employees are examined on entrance and at regular intervals therafter. Thirty-one sanatoriums consider a roentgen study essential before the employees enter on their service, 111 make a roentgen examination periodically, and there were seventy-six sanatoriums that failed to specify the frequency of their examinations.

The replies from ninety-three tuberculosis departments indicate that seventy-one require a physical examination, twelve examine the employees "when necessary," fifty-six require roentgen studies, twenty-four make roentgen studies "if indicated," and thirty-two employ the tuberculin test.

In 193 sanatoriums and forty-seven tuberculosis departments both a roentgen and a physical examination are required, and there are ninety-nine sanatoriums and twenty-seven tuberculosis departments that make a tuberculin test in addition.

The health survey is not always extended to all employees, for there were a number of institutions which reported that only nurses are examined.

According to table 15, a roentgen examination of employees is required in 59 per cent of the federal, 52 per cent of the state, 62 per cent of the county, 54 per cent of the city and 27 per cent of the city-county sanatoriums, and in 28 per cent of the sanatoriums under private control. Furthermore, 78 per cent of the federal, 58 per cent of the state, 65 per cent of the county, 59 per cent of the city, 47 per cent of the city-county and 40 per cent of the private sanatoriums require a physical examination. The table lends itself to a similar analysis of the tuberculosis departments.

Table 15.—Health Service for Employees

Control	Number of Sanatoriums Reporting	Number of Sanatoriums Requiring: Physical Examination	Roentgen Examination	Tuberculin Test	Number of Tuberculosis Departments Reporting	Number of Tuberculosis Departments Requiring: Physical Examination	Roentgen Examination	Tuberculin Test
Federal	18	14	10	4	25	24	9	5
State	57	38	34	15	4	3	3	2
County	154	113	107	65	18	10	11	6
City	15	13	12	7	27	21	19	9
City-county	12	7	4	3	2	2	2	1
Private	129	72	51	29	17	11	12	9
Totals	385	257	218	123	93	71	56	32

GENERAL MEDICAL SERVICE

1. *Admission Procedure.*—The admission procedure in tuberculosis hospitals and sanatoriums varies considerably except in the federal institutions, where the eligibility of patients and the method of admission are covered in a uniform manner by specific regulations. In other institutions the patients may apply directly or through the attending physician, tuberculosis clinic, health department, social agencies or a central admission bureau and are admitted on a physician's certificate, on the recommendation of special examiners, on x-ray evidence accompanying the application, or following an examination by the sanatorium staff to substantiate the diagnosis of tuberculosis. To simplify the admission procedure, some of the institutions that comprise a sanatorium system have established a central admission bureau to assist in the classification and assignment of patients. In this manner it is possible to expedite transfers between institutions, readjust

waiting lists, prevent the indiscriminate readmission of patients and maintain a closer check on the local tuberculosis problem.

Although most institutions have definite rules covering the eligibility of patients, there are individual variations on the basis of race, nationality, age, sex, memberships and affiliations, and financial requirements, and as regards the form, type and stage of disease. There are, for example, ten sanatoriums for Negroes exclusive of separate departments in other institutions. Five sanatoriums accept only women, eleven are exclusively for men, and eleven sanatoriums and the twenty-nine preventoriums admit only children, viz.:

Sanatoriums for Men Only		Bed Capacity
Arizona State Elks Association Hosp...	Tucson, Ariz.	35
St. Luke's in-the-Desert Sanatorium....	Tucson, Ariz.	35
Costello Home	Denver	16
Craig Colony	Edgewater, Colo.	50
Veterans Administration Facility.....	Outwood, Ky.	375
Bethesda Hospital (col.).....	Detroit	85
U. S. Marine Hospital.....	Fort Stanton, N. M.	270
Soldiers Tubercular Sanatorium.....	Sulphur, Okla.	109
International Printing Pressmen and Assistants' Union Sanatorium.....	Pressmen's Home, Tenn...	44
Woodmen of the World War Memorial Hospital	San Antonio, Texas.....	180
Lake Tomahawk State Camp.....	Lake Tomahawk, Wis.....	42
Sanatoriums for Women Only		
Arequipa Sanatorium	Manor, Calif.	44
Sunland Sanatorium	Sunland, Calif.	60
Sands House	Denver	47
Holyoke Tuberculosis Sanatorium.....	Holyoke, Mass.	18
Channing Home	Boston	27
Sanatoriums for Children Only		
Comstock Hospital	Tucson, Ariz.	30
Undercliff, Meriden State Tuberculosis Sanatorium	Meriden, Conn.	252
The Seaside	Waterford, Conn.	190
Children's Tuberculosis Sanatorium....	Washington, D. C.	150
Fort Lapwai Tuberculosis Sanatorium.	Lapwai, Idaho	132
Sac and Fox Tuberculosis Sanatorium..	Toledo, Iowa	80
North Reading State Sanatorium.....	North Wilmington, Mass..	297
Westfield State Sanatorium.....	Westfield, Mass.	270
Jicarilla Sanatorium	Dulce, N. M.	56
Neponsit Beach Hospital for Children.	Rockaway Beach, N. Y....	120
Hillcrest Sanatorium	Charleston, W. Va.	42
Sanatoriums for Negroes Only		
McRae Memorial Sanatorium.....	Alexander, Ark.	32
Edgewood Sanatorium	Marshallton, Del.	40
Tuberculosis Home for the Colored...	West Palm Beach, Fla.....	10
Maryland Tuberculosis Sanatorium....	Henryton, Md.	156
Bethesda Hospital	Detroit	85
Fairview Sanatorium	Detroit	66
Good Samaritan Hospital.....	Detroit	29
Jefferson County Tuberculosis Hospital	Beaumont, Texas.....	20
Piedmont Sanatorium	Burkeville, Va.	150
Denmar Sanitarium	Denmar, W. Va.	85

There are nine sanatoriums that admit patients principally on the basis of membership in fraternal or industrial organizations, and two accept patients only for vocational guidance and rehabilitation. Most of the sanatoriums for pulmonary tuberculosis accept all stages of the disease, although a few attempt to limit their admissions to minimal or early cases. Some institutions were originally established for the treatment of recoverable types of tuberculosis. At first this meant that only minimal cases could be accepted, but now with the improved methods of treatment the "recoverable" classification may include also many patients in the moderately advanced and far advanced stages. In some institutions a quota system may be applied to limit the admissions by districts or on the basis of financial support.

2. *General Sanatorium Service.*—In most of the sanatoriums the routine diagnostic study on admission includes a medical history, physical examination, and laboratory and x-ray studies. There is, however, a great variation in the completeness of these examinations. In some institutions the initial examination includes only a brief reference to the medical history, a physical examination limited mainly to the chest, a urinalysis, and a sputum examination. In others the staff obtains a detailed history to determine the source of infection, early symptoms, mode of onset, and so on, and carries out a complete general examination as well as a special chest study. Roentgenograms are included, flat films or stereoscopic; also a fluoroscopic examination, qualitative urinalysis, repeated sputum examinations, blood counts, hemoglobin determinations, blood sedimentation, and a Wassermann or Kahn test. In addition, some of the sanatoriums make routine blood chemistry studies and basal metabolic ratings. Two hundred and fourteen sanatoriums hold diagnostic conferences to discuss observations, classify patients, and outline further treatment.

Roentgen examinations are routine on admission in 398 sanatoriums, a urinalysis in 395, blood counts in 255, sputum examinations in 405, blood sedimentation in 177, and a serologic test for syphilis in 195. Physical examinations are repeated within three months in 382 sanatoriums and every three months or over in fifteen, and thirty institutions reexamine patients "when necessary." In 167 sanatoriums the roentgen studies are repeated within three months, and 114 report roentgen examinations at intervals of from three to six months. Temperatures are taken once a day in twenty-two sanatoriums, twice daily in 215, and three times or oftener in 200. In nearly all institutions the temperature is taken by mouth; only twenty report the routine use of rectal temperatures.

Although rest has long been considered the basic treatment in tuberculosis, there is still considerable variation in the application of rest therapy, especially as regards rest periods, visiting hours and graduated exercise. In many institutions the patients remain on strict bed rest until all symptoms have disappeared and the physical condition is shown to be satisfactory by roentgen examination. Some sanatoriums, on the other hand, begin mild forms of exercise much earlier. Many institutions have recently placed increased emphasis on the importance of routine rest therapy and have established definite rest hours both in the morning and in the afternoon. One hundred and fifty-one sanatoriums maintain one rest period daily and 273 require two or more periods of enforced rest.

Visiting hours have been restricted in several sanatoriums to avoid the unnecessary disturbance of patients and interference with the methods of treatment. In 280 sanatoriums visiting is permitted daily, whereas in 135 institutions it is restricted to two or three times a week.

MEDICAL FACILITIES

1. *Pneumothorax.* — The increased use of collapse therapy has been one of the main factors responsible for the great progress made in the tuberculosis field during the last twenty years. Of the various forms of collapse, artificial pneumothorax is by far the most popular and has become indispensable in the operation of a scientific and progressive tuberculosis service. Its sphere of usefulness is not limited to the sanatoriums alone but has extended into the general medical field as well.

A total of 406 sanatoriums and 101 of the principal tuberculosis departments report facilities for pneumothorax. The sanatoriums include seventeen federal institutions and fifty-nine state, 160 county, seventeen municipal, twelve city-county and 141 private sanatoriums. In some institutions, where the pneumothorax apparatus is furnished by the visiting staff, the treatments may be administered at the institution or

in the doctors' offices. The technic of pneumothorax administration varies considerably in the different institutions. In some the procedure is in the nature of a major surgical operation requiring a rigid aseptic technic, whereas in others it involves mainly the use of sterile needles and the usual skin preparation.

Table 16 shows the number of special therapeutic procedures carried out in approximately 400 sanatoriums and 100 of the principal tuberculosis departments. During a twelve months period there were 561,567 pneumothorax treatments administered, 29,678 in the federal institutions, 443,927 in the other public institutions, and 87,962 in the tuberculosis institutions under private control. The departments and the sanatoriums administered relatively the same number of pneumothorax treatments, for there were 450,100 treatments given in the 401 sanatoriums of 59,913 beds and 111,467 in the 101 departments in which the bed capacity was 14,170. A group of institutions reported 16,401 initial pneumothorax treatments and 503,573 refills, indicating an annual ratio of approximately 1 : 30.

Incidentally, 82 tuberculosis departments and 292 sanatoriums report a total of 2,076 oleothorax treatments.

2. *Surgery.*—Apparently the centralization of tuberculosis surgery continues to predominate in the sanatorium field. True, a number of sanatoriums are equipped for major operative procedures, but it is nevertheless still the practice in the majority of institutions to transfer the special chest surgery to nearby surgical centers. Even some of the sanatoriums that have surgical facilities find it difficult to supply a competent surgical staff and provide the volume of operative work necessary to maintain technical proficiency.

There has been a tendency in recent years to construct sanatoriums with complete facilities not only for major operative procedures but also for eye, ear, nose and throat, orthopedic and urologic surgery. Whether this trend will influence the practice of tuberculosis surgery remains to be seen. It is certain, however, that the mounting cost of construction will tend to preserve the present system of centralization.

The sanatoriums do not necessarily refer all types of surgery, although there are many that transfer their patients for phrenic nerve operations as well as for thoracoplasties and pneumolyses. Of the 471 sanatoriums included in this report, 364 have made arrangements for minor surgery, 138 have equipment for major operations, and 152 report facilities for special chest surgery. On the other hand, there are 333 institutions which have established affiliations with surgical centers. The distribution of surgical facilities in the various types of sanatoriums are given in the following table.

Surgical Facilities in Various Types of Sanatoriums

Control	No. of Sanatoriums	Minor Surgery	Major Surgery	Special Chest Surgery	Surgical Affiliation
Federal	18	18	15	13	11
State	65	58	21	26	46
County	173	139	51	59	130
City	22	16	11	9	16
City-county	15	11	2	5	12
Private	178	122	38	40	118
Totals	471	364	138	152	333

Reports from approximately 400 sanatoriums and 100 of the principal tuberculosis departments indicate that 2,935 thoracoplasties, 929 pneumolyses and 7,695 phrenic nerve operations were performed during a twelve months period. In checking a group of 122 tuberculosis departments of general and other hospitals it was found that 108 have equipment for minor surgery, ninety-four have facilities for major operative work and eighty-five have facilities for special chest surgery. Thirty-nine departments maintain a surgical affiliation with other hospitals.

Table 16—Special Therapeutic Procedures
(Based on Reports Received During 1934)

	Number of Institutions Reporting	Number of Beds Represented	Total Pneumothorax Treatments	Initial Pneumothorax Treatments	Pneumothorax Refills	Inpatients Receiving Pneumothorax	Outpatients Receiving Pneumothorax	Number of Phrenic Nerve Operations	Thoracoplasties	Pneumolyses	Oleothorax
Sanatoriums											
Federal	14	3,376	7,259	239	7,020	230	54	137	58	6	13
Other public	246	44,933	366,133	9,693	331,003	9,626	4,368	4,762	1,766	629	1,635
Private	141	11,604	76,708	2,432	62,057	1,982	835	1,047	378	115	125
Total sanatoriums	401	59,913	450,100	12,364	400,080	11,838	5,257	5,946	2,202	750	1,773
Departments											
Federal	23	4,644	22,419	494	21,921	592	121	273	19	...	51
Other public	55	7,967	77,794	3,254	71,896	1,519	1,138	1,269	629	135	247
Private	23	1,559	11,254	289	9,676	214	195	207	85	44	5
Total departments	101	14,170	111,467	4,037	103,493	2,625	1,454	1,749	733	179	303
Total sanatoriums and departments	502	74,083	561,567	16,401	503,573	14,463	6,711	7,695	2,935	929	2,076

3. *Dental Service.*—There appears to be little uniformity in the supply of dental facilities in the tuberculosis sanatoriums. For the most part, however, the larger sanatoriums, especially governmental institutions, are equipped for dental service in a fairly complete manner. Many have departments containing several complete dental units, dental laboratory facilities and x-ray equipment and are staffed by competent professional and technical personnel.

On the other hand, there are many departments which are equipped with only a dental chair and depend on the visiting dentist to furnish the necessary instruments. Between these extremes there are all types of variation. More than 40 per cent of the sanatoriums do not have a dental department but call local dentists as necessary.

Thirty institutions maintain a full-time dental staff, either regular salaried dentists or dental interns, and in 284 the dental service is on a definite part-time basis.

Complete dental facilities are furnished in the sanatoriums of the Veterans Bureau and the U. S. Public Health Service but are more limited in the sanatoriums of the Indian Administration, where small institutions predominate. Approximately 74 per cent of the state

sanatoriums report dental departments, 66 per cent of the county sanatoriums, 59 per cent of the municipal sanatoriums, 60 per cent of the city-county sanatoriums and 41 per cent of the private institutions.

According to the following tabulation there are special dental facilities in sixteen federal sanatoriums, 73 private institutions and 184 other civilian sanatoriums.

Special Dental Facilities

Control	Number of Sanatoriums	Dental Departments	Sanatoriums Employing Dentists	
			Full Time	Part Time
Federal	18	16	7	9
State	65	48	8	47
County	173	114	6	116
City	22	13	4	11
City-county	15	9	1	9
Private	178	73	4	92
Totals	471	273	30	284

4. *X-Ray Facilities.*—The present survey indicates that 77 per cent of the sanatoriums have roentgenographic equipment, 78 per cent offer fluoroscopic facilities, 67 per cent have stereoscopic equipment, and 22 per cent of the institutions refer part or all of their x-ray work to other hospitals. The following tabulation shows the distribution of x-ray facilities in the sanatorium field:

X-Ray Facilities in Sanatoriums

Control	Number of Sanatoriums	X-Ray Equipment	Fluoroscopic Equipment	Stereoscopic Equipment	X-Ray Work Referred
Federal	18	18	17	17	1
State	65	59	59	51	3
County	173	144	142	132	35
City	22	18	17	15	5
City-county	15	10	11	9	5
Private	178	115	122	92	56
Totals	471	364	368	316	105

The extent to which these facilities are used is illustrated by the number and frequency of roentgen examinations. Four hundred and thirty-two sanatoriums reported 62,873 patients admitted, 459,316 roentgen examinations and 356,917 fluoroscopic studies during a twelve months period. Consequently, the yearly average is approximately seven roentgen examinations and five and one-half fluoroscopic examinations per patient. As shown in the accompanying table, these averages are nearly the same for all classes of sanatoriums except the federal group, in which the fluoroscopic examinations average slightly more than two per patient.

Use of X-Ray Facilities

Control	Number of Sanatoriums Reporting	Number of Patients Admitted	Number of Roentgen Examinations	Number of Fluoroscopic Examinations
Federal	17	4,384	28,134	9,070
State	59	18,434	121,654	87,416
County	169	18,988	165,864	129,192
City	21	8,198	64,057	43,801
City-county	14	2,779	17,002	21,546
Private	152	10,090	62,605	65,892
Totals	432	62,873	459,316	356,917

Eighty-four per cent of the sanatoriums require a roentgen examination on admission, 35 per cent repeat the examination within three months, 24 per cent repeat it in from three to six months, and in 27 per cent of the institutions the roentgen study is repeated when necessary. The frequency of roentgen examination is shown in the following tabulation.

Technical personnel is employed in the x-ray departments of thirteen federal and 245 civilian sanatoriums. There are technicians in fifty-three state, ninety-five county, eleven municipal, eight city and county sanatoriums and seventy-eight sanatoriums under private management.

As regards professonal supervision over the x-ray departments, there is considerable variation. Only eight sanatoriums have resident roentgenologists. In 220 the medical director maintains supervision, and in 144 the medical staff as a whole is responsible for the interpretations. Eighty-seven sanatoriums report the service of a consulting roentgenologist.

Frequency of Roentgen Examination

Sanatoriums	Required on Admission	Roentgen Examination Repeated		
		Within Three Months	Three to Six Months	When Necessary
Federal	17	5	8	2
State	57	17	20	22
County	159	72	41	47
City	20	5	8	7
City-county	12	4	4	6
Private	133	64	33	44
Totals	398	167	114	128

5. *Laboratory Service.*—Although 364 tuberculosis sanatoriums have clinical laboratory facilities, there are relatively few that offer a complete service. Many find it advantageous to refer sputum examinations, bacteriologic studies and serologic studies to the public health laboratories or other departments. In fact, 375 sanatoriums have indicated that part or all of their laboratory work is referred to outside laboratories.

Table 17 shows the laboratory facilities available in the tuberculosis sanatoriums. There is equipment for urinalysis in 378 institutions, for blood counts in 349, for sputum examinations in 346, and for blood sedimentation tests in 278. Blood chemistry examinations can be carried out in 169, bacteriologic studies in 209, and basal metabolic ratings in 133. Seventy sanatoriums have facilities for tissue pathology. In eighty-nine institutions there is equipment for serologic tests, and 129 sanatoriums have laboratory animals for bacteriologic studies or research.

Routine Laboratory Tests

Control	Number of Sanatoriums	Routine Examinations				
		Urinalysis	Blood Counts	Sputum Examinations	Serologic	Blood Sedimentation
Federal	18	18	13	17	10	9
State	65	59	39	57	32	36
County	173	154	94	159	89	69
City	22	19	11	20	14	3
City-county	15	14	6	14	8	5
Private	178	131	92	138	42	55
Totals	471	395	255	405	195	177

In a number of sanatoriums there are certain laboratory tests which are considered sufficiently important to be classed as routine procedures. The table entitled "Routine Laboratory Tests" shows the number of institutions in which various laboratory tests are performed as a routine on admission. A urinalysis is routine in 395 sanatoriums, blood counts in 255, sputum examinations in 405, serologic studies in 195, and a blood sedimentation test in 177.

Two hundred and seventy-eight sanatoriums report on the amount of laboratory work carried out during a period of twelve months. They admitted 56,033 patients and performed 1,523,953 laboratory examinations, a ratio of 27 examinations per patient. As shown in the next tabulation, the ratio of laboratory examinations to patients admitted is 36:1 in the federal sanatoriums, 24:1 in the state institutions, 26:1 in the county group, 43:1 in the municipally owned sanatoriums, 13:1 in the city-county institutions, and 23:1 in the sanatoriums under private control.

Ratio of Laboratory Examinations to Patients

Control	Sanatoriums Reporting	Patients Admitted	Laboratory Examinations	Examinations per Patient
Federal	11	3,289	118,863	36
State	51	17,227	413,106	24
County	112	16,809	436,562	26
City	13	7,334	316,363	43
City-county	11	2,270	30,155	13
Private	80	9,104	208,904	23
Totals	278	56,033	1,523,953	27

Professional supervision is lacking in most of the laboratory departments, except as it is furnished by the regular medical staff. Only eleven sanatoriums employ resident pathologists, but consultants are available in eighty-five. Thirteen federal and 246 civilian sanatoriums have technical personnel for the laboratory department. Technicians are employed in fifty state, 100 county, eleven municipal, seven city and county, and seventy-eight private sanatoriums.

6. *Necropsy Service.*—Necropsy performance in hospitals has come to be considered an indication of the scientific attitude of the medical staff. From an educational point of view the necropsy is indispensable. It serves to provide a sound foundation on which to build clinical knowledge and by correlation affords a better understanding of the various clinical manifestations of tuberculosis. Especially the younger members of the staff who are lacking in experience will benefit from repeated necropsies even though a certain uniformity of observations may occur. No postmortem examination, however routine in character, is devoid of educational value.

Of the 471 tuberculosis sanatoriums, 124 have facilities for necropsy work. During the annual period considered in this report there were 10,923 deaths reported and 1,869 necropsies, indicating an average necropsy rate of 17 per cent. The incidence of necropsy performance is relatively low in some of the sanatorium groups. In the federal sanatoriums the average necropsy rate is 25 per cent, in the state sanatoriums 11 per cent, in the county group 15 per cent, in the city institutions 37 per cent, in the city and county sanatoriums 10 per cent, and in those operated under private control 9 per cent. Individual variations are still greater, however, for there are many institutions that make no effort whatever to obtain permission for necropsy work. On the other hand, some of the more progressive sanatoriums exceed by far the minimum of 15 per cent that is required in institutions approved by the American Medical Association for educational residencies in tuberculosis.

In the tabulation are shown the number of sanatoriums that have necropsy facilities, the number of deaths and necropsies, and the percentage of necropsies in the various sanatorium classifications.

7. *Heliotherapy.*—Facilities for heliotherapy are quite uniformly present in the sanatorium group. Most of the institutions have made convenient arrangements for sun therapy on porches, on roof solariums or in sun pens. As regards artificial heliotherapy, there is a considerable variation in equipment. Many of the larger sanatoriums, especially those which also conduct a preventorium service, have large and well equipped heliotherapy departments for treatment *en masse*. In others, portable lamps may suffice.

It appears that in the use of heliotherapy the tuberculosis institutions adhere fairly closely to the methods and indications now generally accepted. A few, however, employ heliotherapy as a routine procedure for practically all patients regardless of the type, stage or activity of the disease. Of the 602 institutions that replied to the questionnaire, 440 reported facilities for artificial heliotherapy and a total of 1,589,720 treatments: 1,114,709 for adults, 320,704 for children and 154,307 not classified.

Table 17—Laboratory Facilities in Tuberculosis Sanatoriums

Control	Number of Sanatoriums	Urinalysis	Blood Counts	Sputum Examinations	Blood Sedimentations	Blood Chemistry	Bacteriology	Serology	Tissue Pathology	Laboratory Animals	Basal Metabolism	Refer Examinations
Federal	18	18	18	18	16	8	13	9	8	8	8	11
State	65	58	58	58	52	39	44	11	12	28	26	55
County	173	148	133	128	101	63	69	25	26	41	47	149
City	22	20	16	16	14	12	15	9	8	10	8	18
City-county	15	11	10	9	7	3	6	3	1	3	3	13
Private	178	123	114	117	88	44	62	32	15	39	41	129
Totals	471	378	349	346	278	169	209	89	70	129	133	375

Necropsies

Control	Number of Sanatoriums	Necropsy Facilities	Deaths Reported	Necropsies Performed	Necropsy Percentage
Federal	18	8	590	147	25
State	65	30	2,116	227	11
County	173	52	4,017	635	15
City	22	10	1,716	629	37
City-county	15	2	573	58	10
Private	178	22	1,911	173	9
Totals	471	124	10,923	1,869	17

EDUCATIONAL ACTIVITIES IN TUBERCULOSIS INSTITUTIONS

The tuberculosis hospitals and sanatoriums have an important function to perform in the training of physicians, nurses and other personnel for institutional and community needs. At the same time the educational function helps to raise the standards of medical service throughout the tuberculosis field. Thus benefits will accrue to individual patients and to the communities at large.

1. *Training of Physicians.*—As tuberculosis is not a limited specialty but one in which nearly every practitioner participates, it is important that all physicians receive a thorough basic training in tuberculosis.

Undergraduate instruction in tuberculosis is generally considered a responsibility of the medical schools, but the sanatoriums can be of service by contributing clinical and necropsy material for teaching purposes. Similarly, the training of interns is not a function of the sanatorium, since the fifth year in medicine should afford a general training in medicine, surgery, obstetrics and the specialties. Nevertheless sanatoriums can be of assistance in establishing affiliate services in tuberculosis, which adds considerably to the interns' training in medicine.

Sanatoriums and Hospitals Approved by the American Medical Association for the Training of Resident Physicians in Tuberculosis

Arroyo Sanatorium	Livermore, Calif.
Barlow Sanatorium	Los Angeles
*Los Angeles County Hospital	Los Angeles
Pottenger Sanatorium and Clinic	Monrovia, Calif.
*Santa Clara County Hospital	San Jose, Calif.
Union Printers' Home and Tuberculosis Sanatorium	Colorado Springs, Colo.
National Jewish Hospital	Denver
Sanatorium of the Jewish Consumptives' Relief Society	Spivak, Colo.
Meriden State Tuberculosis Sanatorium	Meriden, Conn.
*New Haven Hospital	New Haven, Conn.
Norwich State Tuberculosis Sanatorium (Uncas-on-Thames)	Norwich, Conn.
City of Chicago Municipal Tuberculosis Sanitarium	Chicago
Macon County Tuberculosis Hospital	Decatur, Ill.
Rockford Municipal Tuberculosis Sanatorium	Rockford, Ill.
Boehne Tuberculosis Hospital	Evansville, Ind.
Indiana State Sanatorium	Rockville, Ind.
Western Maine Sanatorium	Greenwood Mountain, Me.
*Baltimore City Hospitals	Baltimore
Maryland Tuberculosis Sanatorium	State Sanatorium, Md.
Rutland State Sanatorium	Rutland, Mass.
Plymouth County Hospital	South Hanson, Mass.
Middlesex County Sanatorium	Waltham, Mass.
Belmont Hospital	Worcester, Mass.
*University Hospital	Ann Arbor, Mich.
American Legion Hospital	Battle Creek, Mich.
Herman Kiefer Hospital	Detroit
Michigan State Sanatorium	Howell, Mich.
Jackson County Sanatorium	Jackson, Mich.
Morgan Heights Sanatorium	Marquette, Mich.
William H. Maybury Sanatorium	Northville, Mich.
Nopeming Sanatorium	Nopeming, Mich.
Glen Lake Sanatorium	Oak Terrace, Minn.
City Isolation Hospital	St. Louis
Mount St. Rose Sanatorium	St. Louis
Robert Koch Hospital	St. Louis
New Jersey Sanatorium for Tuberculosis Diseases	Glen Gardner, N. J.
*Medical Center of Jersey City	Jersey City, N. J.
Hudson County Tuberculosis Hospital and Sanatorium	Secaucus, N. J.
*Albany Hospital	Albany, N. Y.
Montefiore Hospital Country Sanatorium	Bedford Hills, N. Y.
*Kings County Hospital	Brooklyn
Loomis Sanatorium	Loomis, N. Y.
Metropolitan Life Insurance Company Sanatorium	Mount McGregor, N. Y.
*Bellevue Hospital	New York City
*Lenox Hill Hospital	New York City
*Metropolitan Hospital	New York City
*Montefiore Hospital for Chronic Diseases	New York City
Municipal Sanatorium	Otisville, N. Y.
New York State Hospital	Ray Brook, N. Y.
Iola-Monroe County Tuberculosis Sanatorium	Rochester, N. Y.
Sea View Hospital	Staten Island, N. Y.
Trudeau Sanatorium	Trudeau, N. Y.
*Grasslands Hospital	Valhalla, N. Y.
North Carolina Sanatorium	Sanatorium, N. C.
*City Hospital	Cleveland
Ohio State Sanatorium	Mt. Vernon, Ohio
Sunny Acres, Cleveland Tuberculosis Sanatorium	Warrensville, Ohio
Eagleville Sanatorium for Consumptives	Eagleville, Pa.
*Philadelphia General Hospital	Philadelphia
White Haven Sanatorium	White Haven, Pa.
Pine Breeze Sanatorium	Chattanooga, Tenn.
St. Joseph's Sanatorium	El Paso, Texas
Hopemont Sanatorium	Hopemont, W. Va.
Wisconsin State Sanatorium	Statesan, Wis.

* Approved also for interns.

The replies to the questionnaire indicate that there are thirteen state, eighteen county, seven city, four city-county and ten private sanatoriums which provide facilities for the training of medical students. Twelve state, thirty county, six city, three city-county and twelve private sanatoriums participate in the training of interns. Incidentally, training opportunities in tuberculosis are offered by 159 approved intern hospitals that report the admission of tuberculous patients for temporary or continued treatment.

The tuberculosis hospitals and sanatoriums do have a definite responsibility, however, for postgraduate training in tuberculosis. This applies to short courses for general practitioners, to educational residencies in tuberculosis, and to advanced postgraduate courses.

Perhaps even more important than the training of undergraduates is the establishment of educational residencies in the tuberculosis institutions. A resident in tuberculosis is a physician who has completed his general internship and is continuing for a period of at least twelve months in a sanatorium or tuberculosis department in order to gain supervised experience in the specialty of tuberculosis. During his term of service, the resident should broaden his general knowledge of tuberculosis. He should learn diagnostic methods, the technic of therapeutic procedures and the routine management of a sanatorium service, including the details of rest treatment, the methods of graduated exercise and the management of ambulatory patients.

The diagnostic training involves accurate history taking, careful and systematic examinations, a correlation of physical observations with roentgen and fluoroscopic studies, and the exercise of medical judgment in diagnosis and subsequent therapy. Necropsy performance plays an important part in the diagnostic service, in that it correlates the anatomic and the clinical manifestations of tuberculosis.

Technical training is an essential part of the educational program. The resident should have an opportunity to study the various forms of collapse therapy and should become proficient in the technic of artificial pneumothorax, both initial administration and refills.

Ninety-three sanatoriums and forty-four tuberculosis departments report an educational service for resident physicians. There are twenty-five state, thirty-eight county, seven city, four city-county and nineteen private sanatoriums in this group. The list of the sanatoriums and hospitals approved by the American Medical Association for the training of resident physicians in tuberculosis includes fifteen hospitals (marked by an asterisk) that are also approved for interns.

While the present survey indicates that the training of undergraduates and residents is the most important educational function of the tuberculosis institutions, there are other tendencies coming into prominence which deserve recognition. With increasing frequency the sanatoriums are establishing short courses for the local medical profession, usually of only a few days' duration but of sufficient length to demonstrate the methods of sanatorium routine, diagnostic procedures and therapy. These meetings also serve to develop the interest of the medical profession in the sanatorium work and to give individual physicians a better understanding of the factors involved in the control of tuberculosis.

Similarly, many of the leading tuberculosis sanatoriums have established a close cooperation with the local county medical society, periodically assuming the responsibility for the program of the society meetings. In this way the sanatoriums acquaint the organized medical profession with the aims and functions of the institution and, through a presentation of interesting cases and roentgenograms, are able to demonstrate the accomplishments of a sanatorium service. It is hoped

that both the establishment of short courses and the cooperation with local medical societies will continue to develop as a means of general postgraduate training.

There are at present sixty-seven sanatoriums offering postgraduate training of some form. These include two federal, thirteen state, thirty-three county, four city, three city-county and twelve private institutions. The duration of the course is reported as two weeks or less in nine sanatoriums, from two to four weeks in four, and over four weeks in nineteen institutions. Thirty-five did not state the length of training. Two sanatoriums, the New York State Hospital, Ray Brook, and the Trudeau Sanatorium, Trudeau, N. Y., have been approved by the American Medical Association for postgraduate training in tuberculosis. The Trudeau School of Tuberculosis, established in 1916, has rendered noteworthy educational service to physicians engaged in sanatorium work and to other postgraduate students. The course, offered annually, is of from four to six weeks' duration and may be combined with additional study in Saranac Lake or in the chest service of Bellevue Hospital, New York City.

2. Training of Nurses in Tuberculosis.—This report does not deal with the needs of nursing education, nor is it concerned with the actual methods of training, but aims chiefly to enumerate the educational opportunities for nurses in the tuberculosis field.

The training schools in tuberculosis institutions may offer (1) combined courses leading to state registration, (2) affiliate courses for nurses from other hospitals, (3) postgraduate training for graduates, (4) courses for practical nurses, and (5) short courses for attendants employed as nursing aids.

Eighteen sanatoriums have established nurses' training schools, the courses varying in length from one to three years.

Nurses' Training Schools in Sanatoriums

From twelve to twenty-four months:	
Maryland Tuberculosis Sanatorium	Henryton, Md.
Maryland Tuberculosis Sanatorium	State Sanatorium, Md.
Hospital for Consumptives	Towson, Md.
Samuel and Nettie Bowne Memorial Hospital	Poughkeepsie, N. Y.
Trudeau Sanatorium	Trudeau, N. Y.
Pennsylvania State Sanatorium for Tuberculosis No. 2	Cresson, Pa.
Hamburg State Sanatorium for Tuberculosis	Hamburg, Pa.
Pennsylvania State Sanatorium for Tuberculosis	South Mountain, Pa.
Eagleville Sanatorium for Consumptives	Eagleville, Pa.
White Haven Sanatorium	White Haven, Pa.
State Tuberculosis Sanatorium	Sanatorium, Texas
Piedmont Sanatorium	Burkeville, Va.
Catawba Sanatorium	Catawba, Va.
Blue Ridge Sanatorium	Charlottesville, Va.
More than twenty-four months:	
Rutland State Sanatorium	Rutland, Mass.
Essex Sanatorium	Middleton, Mass.
North Carolina Sanatorium	Sanatorium, N. C.
Davidson County Tuberculosis Hospital	Nashville, Tenn.

Seven of the foregoing institutions supplement their training schedule by a general hospital affiliation.

Institutions That Supplement Training Schedule by a General Hospital Affiliation

Maryland Tuberculosis Sanatorium	State Sanatorium, Md.
Rutland State Sanatorium	Rutland, Mass.
Essex Sanatorium	Middleton, Mass.
Trudeau Sanatorium	Trudeau, N. Y.
North Carolina Sanatorium	Sanatorium, N. C.
White Haven Sanatorium	White Haven, Pa.
Davidson County Tuberculosis Hospital	Nashville, Tenn.

Thirty-one sanatoriums report affiliate courses for nurses from other hospitals.

Sanatoriums Reporting Affiliate Courses for Nurses from Other Hospitals

Hillcrest Sanatorium	La Crescenta, Calif.	3 mos.
Arroyo Sanatorium	Livermore, Calif.	2 mos.
Barlow Sanatorium	Los Angeles	4 mos.
National Methodist Episcopal Sanatorium	Colorado Springs, Colo.	
City of Chicago Municipal Tuberculosis Sanitarium	Chicago	3 mos.
Macon County Tuberculosis Sanatorium	Decatur, Ill.	6 wks.
Hillcrest	Quincy, Ill.	6 wks.
Broadlawns, Polk County Public Hospital (Tuberculosis Department)	Des Moines	2 mos.
Hillcrest Sanatorium	Topeka, Kan.	1 wk.
Bangor Sanatorium	Bangor, Me.	
North Reading State Sanatorium	North Wilmington, Mass.	3 mos.
Sunshine Sanatorium	Grand Rapids, Mich.	2 mos.
Glen Lake Sanatorium	Oak Terrace, Minn.	6 wks.
Mississippi State Tuberculosis Sanatorium	Sanatorium, Miss.	6 mos.
Allenwood Sanatorium and Monmouth County Hospital for Tuberculosis	Allenwood, N. J.	2 wks.
New Jersey Sanatorium for Tuberculosis Diseases	Glen Gardner, N. J.	6 wks.
Lakeland Sanatorium	Grenloch, N. J.	3 mos.
Suffolk Sanatorium	Holtsville, N. Y.	2 wks.
Sea View Hospital	Staten Island, N. Y.	3 mos.
Molly Stark Sanatorium	Canton, Ohio	2 wks.
Hamilton County Tuberculosis Sanatorium	Cincinnati	1 mo.
Tuberculosis League Hospital	Pittsburgh	1 mo.
White Haven Sanatorium	White Haven, Pa.	6 mos.
Piedmont Sanatorium	Burkeville, Va.	3 mos.
Catawba Sanatorium	Catawba, Va.	
Blue Ridge Sanatorium	Charlottesville, Va.	
Laurel Beach Sanatorium	Seattle	1 mo.
Edgecliff Sanatorium	Spokane	2 mos.
Mount View Sanatorium	Wausau, Wis.	2 mos.
Muirdale Sanatorium	Wauwatosa, Wis.	3 mos.
Wyoming Tuberculosis Sanatorium	Basin, Wyo.	2 mos.

The graduate nurse finds limited educational opportunities in the tuberculosis field. According to the reports received there are only five sanatoriums that conduct postgraduate courses for nurses.

Sanatoriums Conducting Postgraduate Courses for Nurses

Arroyo Sanatorium	Livermore, Calif.	2 mos.
Barlow Sanatorium	Los Angeles	
Santa Clara County Sanatorium	San Jose, Calif.	3 mos.
Middlesex County Sanatorium	Waltham, Mass.	6 mos.
South Dakota State Sanatorium for Tuberculosis	Sanator, S. D.	6 mos.

Principal Tuberculosis Departments Conducting Nursing Schools

St. Mary's Hospital and Sanatorium	Tucson, Ariz.
San Joaquin General Hospital	French Camp, Calif.
Fresno County General Hospital	Fresno, Calif.
San Bernardino County Charity Hospital (affiliate)	San Bernardino, Calif.
San Francisco Hospital (postgraduate)	San Francisco
Glockner Sanatorium and Hospital	Colorado Springs, Colo.
St. Francis Hospital and Sanatorium	Colorado Springs, Colo.
Mennonite Hospital and Sanatorium	La Junta, Colo.
William Wirt Winchester Hospital (Department of New Haven Hospital)	West Haven, Conn.
Cook County Hospital	Chicago
Shreveport Charity Hospital	Shreveport, La.
Burbank Hospital	Fitchburg, Mass.
State Infirmary	Tewksbury, Mass.
University Hospital	Ann Arbor, Mich.
Herman Kiefer Hospital (affiliate)	Detroit
St. Luke's Hospital	Duluth, Minn.
St. Mary's Hospital	Duluth, Minn.
Fairview Hospital	Minneapolis
Ancker Hospital	St. Paul
City Isolation Hospital	St. Louis
Medical Center of Jersey City	Jersey City, N. J.
St. Joseph Sanatorium and Hospital	Albuquerque, N. M.
St. Vincent's Sanatorium and Hospital	Santa Fe, N. M.
Kings County Hospital	Brooklyn
Buffalo City Hospital	Buffalo
Lenox Hill Hospital	New York City
Metropolitan Hospital	New York City
Grasslands Hospital	Valhalla, N. Y.
Jefferson Medical College Hospital	Philadephia
Philadelphia General Hospital	Philadelphia
Charles V. Chapin Hospital	Providence, R. I.
Salt Lake General Hospital (affiliate)	Salt Lake City
Firland Sanatorium and Isolation Hospital	Richmond Highlands, Wash.

Aside from the sanatoriums there are 740 hospitals with tuberculosis departments of varying size. Nursing schools are conducted in 268 of these hospitals,

including the institutions listed in the accompanying tabulation, which represent some of the principal tuberculosis departments.

3. *Training of Patients.*—As long as the tuberculosis institutions continue the hospitalization of nontuberculous children, there will be need for general educational activities comparable to those of the public schools. Naturally, certain limitations will be imposed in accordance with the physical condition of the child, but the objectives of training will remain the same as when the child is at home.

Schools for children are maintained in the preventoriums and in 159 tuberculosis sanatoriums. The teaching may be limited to certain grades or may extend through high school. In some institutions the teaching staff is employed privately; in others, by the local department of education. According to reports, there are schools for children in five federal, thirty-two state, eighty-one county, nine municipal and seven city-county sanatoriums, and in twenty-five sanatoriums under private management.

Of even greater importance is the educational service for adults including rehabilitation. The sanatoriums necessarily retain a certain responsibility in the postsanatorium management of patients, from both an economic and a medical point of view. Perhaps only a fourth of the patients discharged are able to return to a normal life, many are permanently incapacitated, and others, although able to work, must limit their activities for many years.

Economically, it is of advantage to reeducate the latter group to a life of economic independence. First of all, these patients must be taught to respect the limits of their physical tolerance; secondly, they must be instructed in occupations that will not tax them beyond their endurance; and, thirdly, they must be assisted financially, if necessary, to live a normal life and avoid a reactivation of the disease. Efforts made to eliminate the need of further hospitalization are well worth while when one considers the cost of prolonged sanatorium care.

While many institutions favor the employment of graduated exercise to insure a complete physical recovery, there are others which lack the necessary housing facilities and funds to carry out such a plan. In some, the pressure of a waiting list may prevent hospitalization after the stage of "quiescence" has been reached, and in others, in which definite limitations have been placed on the hospital service, the patients may be discharged even earlier.

Two hundred and forty-one sanatoriums reported on the use of graduated exercise. Two required half an hour of exercise before discharge, nineteen one hour, fifty-four two hours, eighty-six from three to six hours, and nine from six to eight hours. Eight sanatoriums expressed their exercise requirements in terms of from one to three months, and three required exercise over a period of from four to six months. In eleven sanatoriums daily walks up to three miles were required, while in seven the exercise was extended from three to eight miles. Thirty-nine other sanatoriums that indicated the use of graduated exercise failed to state the amount.

The exercise program is combined with educational activities in many institutions. There are forty-five sanatoriums conducting schools for adults, 141 offer various forms of occupational therapy, and fifty-three have industrial rehabilitation courses. The extent to which these facilities are provided by the various classes of sanatoriums is shown in the accompanying tabulation.

Two sanatoriums have been established primarily for rehabilitation, and there are others which combine a convalescent colony with the regular sanatorium service. On the whole, however, there are relatively few sanatoriums offering vocational training—far too few to cope successfully with the problem of postsanatorium care. The sanatoriums in the accompanying list, which report facilities for industrial rehabilitation, may differ widely in their methods and scope of training.

Educational Facilities for Patients

Sanatoriums	Schools for Adults	Occupational Therapy Departments	Industrial Rehabilitation
Federal	3	12	1
State	6	20	8
County	23	61	26
City	5	10	4
City-county	2	2	2
Private	6	36	12
Totals	45	141	53

Sanatoriums Reporting Facilities for Industrial Rehabilitation

Wish-I-ah Sanatorium	Auberry, Calif.
Humboldt County School for the Tuberculous	Eureka, Calif.
Stony Brook Retreat	Keene, Calif.
Hillcrest Sanatorium	La Crescenta, Calif.
Arroyo Sanatorium	Livermore, Calif.
Bret Harte Sanatorium	Murphy, Calif.
Olive View Sanatorium	Olive View, Calif.
Independent Order of Foresters California Tuberculosis Sanatorium	Pacoima, Calif.
Hassler Health Home	Redwood City, Calif.
Santa Clara County Sanatorium	San Jose, Calif.
Weimar Joint Sanatorium	Weimar, Calif.
Ex-Patients Tubercular Home	Denver
National Jewish Hospital	Denver
Sanatorium of the Jewish Consumptives' Relief Society	Spivak, Colo.
City of Chicago Municipal Tuberculosis Sanitarium	Chicago
Rockford Municipal Tuberculosis Sanatorium	Rockford, Ill.
Lake County Tuberculosis Sanatorium	Crown Point, Ind.
Sunnyside Sanatorium	Oaklandon, Ind.
State Sanatorium for Tuberculosis	Oakdale, Ia.
Central New England Sanatorium	Rutland, Mass.
Middlesex County Sanatorium	Waltham, Mass.
Calhoun County Public Hospital	Battle Creek, Mich.
Michigan State Sanatorium	Howell, Mich.
Jackson County Sanatorium	Jackson, Mich.
Ingham Sanatorium	Lansing, Mich.
Morgan Heights Sanatorium	Marquette, Mich.
East Lawn Sanatorium	Northville, Mich.
Pine Crest Sanatorium	Powers, Mich.
Minnesota State Sanatorium	Ah-Gwah-Ching, Minn.
Nopeming Sanatorium	Nopeming, Minn.
Glen Lake Sanatorium	Oak Terrace, Minn.
Pokegama Sanatorium	Pokegama, Minn.
Robert Koch Hospital	St. Louis
Pembroke Sanatorium	Pembroke, N. H.
New Jersey Sanatorium for Tuberculosis Diseases	Glen Gardner, N. J.
Valley View Sanatorium	Paterson, N. J.
Essex Mountain Sanatorium	Verona, N. J.
U. S. Marine Hospital	Ft. Stanton, N. M.
Potts Memorial Hospital	Livingston, N. Y.
Municipal Sanatorium	Otisville, N. Y.
Sea View Hospital	Staten Island, N. Y.
Hamilton County Tuberculosis Sanatorium	Cincinnati
Oregon State Tuberculosis Hospital	Salem, Ore.
White Haven Sanatorium	White Haven, Pa.
Pinehaven Sanatorium	Navy Yard, S. C.
Mount Washington Sanatorium	Eau Claire, Wis.
Lake Tomahawk State Camp	Lake Tomahawk, Wis.
Lakeview Sanatorium	Madison, Wis.
Morningside Sanatorium	Madison, Wis.
Oak Sanatorium	Pewaukee, Wis.
Wisconsin State Sanatorium	Statesan, Wis.
Muirdale Sanatorium	Wauwatosa, Wis.
Wyoming Tuberculosis Sanatorium	Basin, Wyo.

This list indicates that some effort is being made toward vocational rehabilitation in nineteen states, although in some only one or a few sanatoriums participate. Five of these states report an organized rehabilitation service under the direction of the state bureau of vocational education or corresponding agency. Reports from departments of health indicate that in

eight other states vocational guidance is being attempted on a smaller scale by departments of education, local tuberculosis associations, and other organizations.

In a well balanced sanatorium service there must be proper emphasis on prevention, therapy and rehabilitation. Apparently the latter has failed to keep step with the other phases of tuberculosis control.

Another feature of the educational service in tuberculosis sanatoriums is the personal instruction given patients on the general principles of tuberculosis therapy and prevention. From the reports it appears that 207 sanatoriums conduct group instruction for patients, and in 238 institutions the medical staff participates in educational courses for the public at large. One should also consider the educational service of the sanatorium field nurse and the social service worker. When properly organized under medical supervision, the field service becomes a distinct asset to an institution and the community. Field nurses are employed in seventy-eight civilian sanatoriums, and social service workers in fifty-nine. Their work is supplemented, however, in various localities by the field activities of the departments of health.

Table 18.—Medical Records in Tuberculosis Sanatoriums

Control	Number of Sanatoriums	Record Departments	Statistical Reports	Record Clerks	Medical History	Social History	Physical Examination	Reexamination Data	Progress Notes	Laboratory Reports	X-Ray Reports	Pneumothorax Record	Hellotherapy Record	Exercise Record	Operative Reports	Weight Record	Nurses' Notes	Temperature and Pulse Records
Federal	18	16	17	11	18	13	18	18	18	18	18	16	15	11	16	18	18	18
State	65	58	59	44	60	55	60	60	59	59	59	56	44	38	50	58	55	60
County	173	149	129	97	158	143	160	157	145	159	156	150	123	103	121	157	146	161
City	22	19	16	16	20	17	21	20	19	21	20	16	16	11	18	18	18	21
City-county	15	13	11	5	13	12	13	13	13	13	13	13	10	9	12	12	13	13
Private	178	132	93	77	140	120	143	140	136	140	136	134	92	84	105	142	133	160
Totals	471	387	325	250	409	360	415	408	390	410	402	385	300	256	322	405	383	433

Tuberculosis Sanatoriums Reporting Research Departments

Pamsetgaaf Sanatorium	Prescott, Ariz.
Hill Crest Sanatorium	La Crescenta, Calif.
Arroyo Sanatorium	Livermore, Calif.
Barlow Sanatorium	Los Angeles
Pottenger Sanatorium and Clinic	Monrovia, Calif.
Olive View Sanatorium	Olive View, Calif.
Veterans Administration Facility	San Fernando, Calif.
Cragmor Sanatorium	Colorado Springs, Colo.
National Jewish Hospital	Denver
Norwich State Tuberculosis Sanatorium	Norwich, Conn.
Laurel Heights State Tuberculosis Sanatorium	Shelton, Conn.
The Seaside	Waterford, Conn.
City of Chicago Municipal Tuberculosis Sanitarium	Chicago
Macon County Tuberculosis Sanatorium	Decatur, Ill.
Boehne Tuberculosis Hospital	Evansville, Ind.
Bangor Sanatorium	Bangor, Me.
Central Maine Sanatorium	Fairfield, Me.
Rutland State Sanatorium	Rutland, Mass.
Veterans Administration Facility	Rutland Heights, Mass.
William H. Maybury Sanatorium	Northville, Mich.
Pine Crest Sanatorium	Oshtemo, Mich.
Glen Lake Sanatorium	Oak Terrace, Minn.
Jasper County Tuberculosis Hospital	Webb City, Mo.
Lakeland Sanatorium	Grenloch, N. J.
Hudson County Tuberculosis Hospital and Sanatorium	Secaucus, N. J.
Valmora Sanatorium	Valmora, N. M.
Potts Memorial Hospital	Livingston, N. Y.
Loomis Sanatorium	Loomis, N. Y.
Seton Hospital	New York City
J. N. Adam Memorial Hospital	Perrysburg, N. Y.
Summit Park Sanatorium	Pomona, N. Y.
New York State Hospital	Ray Brook, N. Y.
National Variety Artists Lodge	Saranac Lake, N. Y.
Sea View Hospital	Staten Island, N. Y.
Trudeau Sanatorium	Trudeau, N. Y.
Veterans Administration Facility	Oteen, N. C.
Edwin Shaw Sanatorium	Akron, Ohio
Hamilton County Tuberculosis Sanatorium	Cincinnati
Rocky Glen Sanatorium	McConnelsville, Ohio
Licking County Tuberculosis Sanatorium	Newark, Ohio
Eagleville Sanatorium for Consumptives	Eagleville, Pa.
Tuberculosis League Hospital	Pittsburgh
Rhode Island State Sanatorium	Wallum Lake, R. I.
Davidson County Tuberculosis Hospital	Nashville, Tenn.
Blue Ridge Sanatorium	Charlottesville, Va.
Hopemont Sanitarium	Hopemont, Va.
Lake View Sanatorium	Madison, Wis.
Morningside Sanatorium	Madison, Wis.
Muirdale Sanatorium	Wauwatosa, Wis.

MEDICAL RESEARCH

Medical research is a commendable feature of the sanatorium service. It stimulates educational activities, develops new methods of diagnosis and therapy, aids in maintaining high standards of medical service and, in general, contributes toward the progress of medicine. In the tuberculosis sanatoriums, research takes the form of clinical investigative work or experimental laboratory studies allied to, or independent of, the clinical activities. Only a few institutions have special departments and personnel for research, but in some of the sanatoriums the regular medical staff undertakes research problems of a clinical nature. Research activities are reported in the forty-nine sanatoriums listed in the accompanying tabulation, of which three are federal, nine state, fifteen county, four city institutions, and eighteen privately owned. In this connection it should be mentioned that the Committee on Medical Research of the National Tuberculosis Association, through annual financial grants, helps to extend and coordinate research in tuberculosis.

MEDICAL LIBRARY FACILITIES

The need of medical library facilities in the tuberculosis institutions is generally recognized. The medical staff, in order to function efficiently, must have ready access to text and reference books on tuberculosis as well as on other specialties of medicine and surgery. It is perhaps of even greater importance that medical journals be available, since the new developments in medicine are usually recorded in medical periodicals long before they appear in book form. A medical library is particularly essential in institutions undertaking the training of young physicians and has been made a requirement for residency approval in tuberculosis. Many tuberculosis institutions make provision in the annual budget for the purchase of books and medical journals. Others, however, depend largely on the private collections of books and journals supplied by the superintendent and other members of the staff. Medical libraries have been established in fifteen federal, forty-four state, seventy-five county, ten municipal, five city-county and sixty-four private sanatoriums.

RECORDS

On the whole, the tuberculosis institutions observe closely the general principles involved in the preparation of administrative, statistical and clinical records, but there are many variations in the methods and forms employed and in the completeness of the data recorded.

Table 19—Replacement Valuation of Tuberculosis Institutions

State	Reported Valuation — Sanatoriums: Number Reporting	Sanatoriums: Beds Represented	Sanatoriums: Valuation Reported	Departments: Number Reporting	Departments: Beds Represented	Departments: Valuation Reported	Preventoriums: Number Reporting	Preventoriums: Beds Represented	Preventoriums: Valuation Reported	Total Beds Represented	Total Valuation Reported	Estimated Valuation — Sanatoriums: Additional Beds	Sanatoriums: Estimated Valuation	Departments: Additional Beds	Departments: Estimated Valuation	Preventoriums: Additional Beds	Preventoriums: Estimated Valuation	Total	Total Valuation All Institutions: Number of Beds	Total Valuation
Alabama	3	187	$ 428,000.00	..	...	$	..	...	$	187	$ 428,000.00	55	$ 183,415.93	220	$ 839,149.74	..	$	$ 1,022,565.67	462	$1,450,565.67
Arizona	11	362	820,000.00	2	325	1,948,735.86	..	...	.....	687	2,777,735.86	443	1,477,331.90	378	1,441,811.83	10	20,070.00	2,939,213.73	1,518	5,716,949.59
Arkansas	2	556	820,840.28	1	22	3,000.00	..	...	.....	578	823,840.28	...	.....	212	808,635.20	...	.....	808,635.20	790	1,632,475.48
California	30	3,736	9,127,715.07	16	1,703	2,912,578.28	4	196	391,500.00	5,635	12,431,793.35	280	933,753.80	1,252	4,775,524.88	222	445,554.00	6,154,832.68	7,389	18,586,626.03
Colorado	17	1,743	7,527,837.84	2	616	1,837,905.24	..	...	.....	2,359	9,365,743.08	...	.....	332	1,266,353.24	..	.....	1,266,353.24	2,691	10,632,096.32
Connecticut	7	1,675	4,550,808.16	2	82	358,247.42	..	...	.....	1,757	4,909,055.58	...	.....	158	602,662.09	..	.....	602,662.09	1,915	5,511,717.67
Delaware	2	161	355,973.83	..	...	.....	..	...	.....	161	355,973.83	...	.....	...	.....	22	44,154.00	44,154.00	183	400,127.83
Dist. Columbia	2	370	1,125,000.00	1	100	775,000.00	..	...	.....	470	1,900,000.00	...	.....	196	747,606.13	..	.....	747,606.13	666	2,647,606.13
Florida	1	66	25,000.00	2	69	75,000.00	..	...	.....	135	100,000.00	20	66,696.70	129	492,046.89	46	92,322.00	651,065.59	330	751,065.59
Georgia	5	645	936,243.50	..	...	.....	1	13	10,000.00	658	946,243.50	...	.....	627	2,391,576.76	..	.....	2,391,576.76	1,285	3,337,820.26
Idaho	1	132	322,291.88	..	...	.....	..	...	.....	132	322,291.88	...	.....	84	320,402.63	..	.....	320,402.63	216	642,694.51
Illinois	23	2,797	7,855,667.95	1	250	2,140,000.00	..	...	.....	3,047	9,995,667.95	681	2,271,022.64	1,652	6,301,251.68	24	48,168.00	8,620,442.32	5,404	18,616,110.27
Indiana	9	1,357	4,558,862.83	..	...	.....	..	...	.....	1,357	4,558,862.83	...	.....	229	873,478.59	..	.....	873,478.59	1,586	5,432,341.42
Iowa	6	774	2,250,610.25	..	...	.....	..	...	.....	774	2,250,610.25	...	.....	207	789,563.62	..	.....	789,563.62	981	3,040,173.87
Kansas	2	328	867,826.12	..	...	.....	..	...	.....	328	867,826.12	60	200,090.10	183	698,020.01	..	.....	898,110.11	571	1,765,936.23
Kentucky	3	574	2,066,675.71	..	...	.....	..	...	.....	574	2,066,675.71	375	1,250,563.12	257	980,279.47	..	.....	2,230,842.59	1,206	4,297,518.30
Louisiana	3	326	820,851.00	1	50	10,000.00	..	...	.....	376	830,851.00	...	.....	677	2,582,292.61	..	.....	2,582,292.61	1,053	3,413,143.61
Maine	4	482	1,030,675.58	..	...	.....	..	...	.....	482	1,030,675.58	...	.....	94	358,545.80	..	.....	358,545.80	576	1,389,221.38
Maryland	8	1,350	3,548,483.00	..	...	.....	..	...	.....	1,350	3,548,483.00	...	.....	200	762,863.40	..	.....	762,863.40	1,550	4,311,346.40
Massachusetts	22	3,591	13,066,282.69	9	834	2,723,155.66	1	30	122,265.00	4,455	15,911,703.35	472	1,574,042.12	423	1,613,456.09	..	.....	3,187,498.21	5,350	19,099,201.56
Michigan	21	3,303	10,569,102.35	4	994	4,910,000.00	..	...	.....	4,297	15,479,102.35	52	173,411.42	622	2,372,505.17	20	40,140.00	2,586,056.59	4,991	18,065,158.94
Minnesota	14	1,883	6,731,835.70	3	247	988,209.01	1	80	250,000.00	2,210	7,970,044.71	77	256,782.30	598	2,280,961.57	..	.....	2,537,743.87	2,885	10,507,788.58
Mississippi	2	527	2,080,000.00	..	...	.....	..	...	.....	527	2,080,000.00	...	.....	245	934,507.67	..	.....	934,507.67	772	3,014,507.67
Missouri	6	1,244	3,215,025.00	..	...	.....	..	...	.....	1,244	3,215,025.00	168	560,252.28	553	2,109,317.30	85	170,595.00	2,840,164.58	2,050	6,055,189.58
Montana	1	150	277,818.00	..	...	.....	..	...	.....	150	277,818.00	...	.....	110	419,574.87	..	.....	419,574.87	260	697,392.87
Nebraska	1	160	400,000.00	2	105	400,000.00	..	...	.....	265	800,000.00	...	.....	42	160,201.31	..	.....	160,201.31	307	960,201.31
Nevada	..	...	.....	..	...	.....	..	...	.....	...	.....	...	.....	18	68,657.71	..	.....	68,657.71	18	68,657.71
New Hampshire	2	210	950,000.00	..	...	.....	..	...	.....	210	950,000.00	...	.....	20	76,286.34	..	.....	76,286.34	230	1,026,286.34
New Jersey	14	2,411	14,690,424.04	2	255	751,902.00	..	...	.....	2,666	15,442,326.04	57	190,085.60	625	2,383,948.13	247	495,729.00	3,069,762.73	3,595	18,512,088.77
New Mexico	7	785	1,833,128.23	3	196	726,666.67	..	...	.....	981	2,559,794.90	85	283,460.98	487	1,857,572.38	..	.....	2,141,033.36	1,553	4,700,828.26
New York	51	8,889	39,951,452.81	10	1,987	10,023,156.96	2	42	25,000.00	10,918	49,999,609.77	761	2,537,809.43	2,693	10,271,955.68	210	421,470.00	13,231,235.11	14,582	63,230,844.88
North Carolina	14	2,042	4,035,808.46	..	...	.....	..	...	.....	2,042	4,035,808.46	410	1,367,282.35	173	659,876.84	..	.....	2,027,159.19	2,625	6,062,967.65
North Dakota	1	265	620,000.00	1	14	31,000.00	..	...	.....	279	651,000.00	...	.....	62	236,487.65	..	.....	236,487.65	341	887,487.65
Ohio	19	3,148	12,104,702.88	2	604	2,323,974.93	1	60	115,000.00	3,812	14,543,677.81	66	220,099.11	792	3,020,939.06	..	.....	3,241,038.17	4,670	17,784,715.98
Oklahoma	6	888	2,277,463.35	..	...	.....	..	...	.....	888	2,277,463.35	...	.....	188	717,091.60	..	.....	717,091.60	1,076	2,994,554.95
Oregon	3	474	697,445.02	..	...	.....	..	...	.....	474	697,445.02	39	130,058.56	109	415,760.55	..	.....	545,819.11	622	1,243,264.13
Pennsylvania	16	4,149	17,205,192.53	5	851	3,812,537.16	..	...	.....	5,000	21,017,729.69	40	133,393.40	1,153	4,397,907.50	100	200,700.00	4,732,000.90	6,293	25,749,730.59
Rhode Island	2	495	900,000.00	1	60	150,000.00	..	...	.....	555	1,050,000.00	...	.....	...	.....	50	100,350.00	100,350.00	605	1,150,350.00
South Carolina	6	539	684,704.81	2	120	178,078.43	..	...	.....	659	862,783.24	...	.....	16	61,029.07	..	.....	61,029.07	675	923,812.31
South Dakota	1	192	750,000.00	..	...	.....	..	...	.....	192	750,000.00	...	.....	105	400,503.29	..	.....	400,503.29	297	1,150,503.29
Tennessee	7	1,124	2,245,000.00	..	...	.....	1	50	40,000.00	1,174	2,285,000.00	...	.....	398	1,518,098.17	..	.....	1,518,098.17	1,572	3,803,098.17
Texas	16	1,896	4,386,717.13	1	433	1,654,536.81	..	...	.....	2,329	6,041,253.94	75	250,112.62	461	1,758,400.14	..	.....	2,008,512.76	2,865	8,049,766.70
Utah	..	...	.....	..	...	.....	..	...	.....	...	.....	...	.....	54	205,973.12	..	.....	205,973.12	54	205,973.12
Vermont	2	127	650,000.00	..	...	.....	1	44	80,000.00	171	730,000.00	...	.....	...	.....	..	.....	.....	171	730,000.00
Virginia	7	1,123	2,773,047.85	1	52	8,000.00	..	...	.....	1,175	2,781,047.85	...	.....	250	953,579.25	..	.....	953,579.25	1,425	3,734,627.10
Washington	7	421	675,531.68	2	518	1,259,067.37	..	...	.....	939	1,934,599.05	330	1,100,495.55	262	999,351.05	..	.....	2,099,846.60	1,531	4,034,445.65
West Virginia	7	772	2,064,500.00	..	...	.....	..	...	.....	772	2,064,500.00	...	.....	77	293,702.41	..	.....	293,702.41	849	2,358,202.41
Wisconsin	18	1,796	5,866,300.15	..	...	.....	..	...	.....	1,796	5,866,300.15	193	643,623.15	392	1,495,212.26	116	232,812.00	2,371,647.41	2,497	8,237,947.56
Wyoming	1	33	200,588.93	..	...	.....	..	...	.....	33	200,588.93	...	.....	32	122,058.14	..	.....	122,058.14	65	322,647.07
Totals	413	60,258	$200,950,434.61	76	10,487	$40,000,751.80	12	515	$1,033,765.00	71,260	$241,984,951.41	4,739	$15,803,783.06	18,047	$68,836,978.89	1,152	$2,312,064.00	$86,952,825.95	95,198	$328,937,777.36

Table 20.—Valuation of Sanatoriums According to Size and Control

Control	Less Than 25 Beds: No. of Beds Represented	Less Than 25 Beds: Valuation Reported	Less Than 25 Beds: Average Valuation per Bed	25–49 Beds: No. of Beds Represented	25–49 Beds: Valuation Reported	25–49 Beds: Average Valuation per Bed	50–99 Beds: No. of Beds Represented	50–99 Beds: Valuation Reported	50–99 Beds: Average Valuation per Bed	100 Beds and Over: No. of Beds Represented	100 Beds and Over: Valuation Reported	100 Beds and Over: Average Valuation per Bed	Total Sanatoriums: No. Institutions Reporting	Total Sanatoriums: No. of Beds Represented	Total Sanatoriums: Valuation Reported	Total Sanatoriums: Average Valuation per Bed
Federal	...	$	$.....	120	$ 328,000.00	$2,733.33	211	$ 451,609.18	$2,140.33	2,270	$ 7,159,254.25	$3,153.86	13	2,601	$ 7,938,863.43	$3,052.24
State	...	.....	.....	154	830,282.74	5,391.45	396	933,923.80	2,358.39	16,758	49,282,408.38	2,940.83	62	17,308	51,046,614.92	2,949.31
County	126	216,252.78	1,716.29	992	2,507,372.98	2,527.59	3,700	11,461,863.22	3,097.80	13,636	54,788,889.44	4,017.96	152	18,454	68,974,378.42	3,737.64
City	18	100,000.00	5,555.55	25	30,000.00	1,200.00	242	506,401.01	2,092.57	6,809	27,972,431.25	4,108.15	19	7,094	28,608,832.26	4,032.82
City-county	24	38,000.00	1,583.33	26	23,000.00	884.62	249	761,323.83	3,057.53	2,124	5,547,532.02	2,611.83	15	2,423	6,369,855.85	2,628.91
Private	345	665,800.00	1,929.85	1,231	2,133,830.90	1,733.41	3,200	7,842,983.87	2,450.93	7,602	27,369,274.96	3,600.27	152	12,378	38,011,889.73	3,070.92
Totals	513	$1,020,052.78	$1,988.41	2,548	$5,852,486.62	$2,298.38	7,998	$21,958,104.91	$2,745.45	49,199	$172,119,790.30	$3,498.44	413	60,258	$200,950,434.61	$3,334.83

An analysis of the reports of the tuberculosis sanatoriums, as shown in table 18, indicates that 387 institutions have record departments, 250 employ special record personnel, and 325 prepare periodic administrative and statistical reports. The clinical records include a medical history in 409 sanatoriums, a social history in 360, a record of the physical examination in 415, reexamination data in 408, progress notes in 390, laboratory reports in 410, x-ray reports in 402, and a pneumothorax record in 385. Heliotherapy records are included in 300 sanatoriums, exercise charts in 256, operative reports in 322, weight charts in 405, nurses' notes in 383, and temperature and pulse charts in 433.

From the inspection reports it was ascertained that the clinical records are fairly complete in 370 institutions, definitely incomplete in fifty-seven, and entirely lacking in forty-four except for nurses' notes and temperature and pulse charts. The present survey indicates that in approximately one fifth of the sanatoriums the clinical and statistical records are inadequate and in many instances entirely lacking.

The lack of uniformity in records is partly due to the fact that many institutions do not have standard record forms but use charts that have been prepared or modified to suit individual needs. In the future, the new and complete record forms devised by the Committee on Record Standardization of the American Sanatorium Association will serve to establish uniform clinical records and comparable statistical data.

There is still some confusion in the methods of classification of patients, although the majority of institutions follow the system advocated by the National Tuberculosis Association and the American Sanatorium Association. In some sanatoriums the statistical data are difficult to interpret because both adults and children are classified together according to types of disease. Since both adults and children are subject to the same forms and types of tuberculosis, there should be little difficulty in classifying them separately, somewhat in the following manner:

Diagnosis	Adults	Children	Total
Pulmonary tuberculosis			
Minimal	....	....	....
Moderately advanced	....	....	....
Far advanced	....	....	....
Childhood tuberculosis	....	....	....
Other forms			
Miliary	....	....	....
Meningeal	....	....	....
Glandular	....	....	....
Bone and joint	....	....	....
Etc.	....	....	....
Nontuberculous	....	....	....
Unclassified	....	....	....

COST OF TUBERCULOSIS HOSPITALIZATION

1. *Valuation of Tuberculosis Institutions.*—The replacement value of buildings, equipment and land is shown in table 19. In all, 501 tuberculosis institutions, representing 71,260 beds, or 74.8 per cent of the total capacity, reported a valuation of $241,984,951.41. This would indicate that the sanatoriums, tuberculosis departments and preventoriums in the United States represent a sum of approximately $328,937,777.36. The sanatoriums alone listed $200,950,434.61 as the value of 60,258 beds, an average of $3,334.83 per bed. By adding the cost of 4,739 additional beds, the total estimated cost is $216,754,217.67, a sum similar to the 1931 estimate of the National Tuberculosis Association. The data from the tuberculosis departments were not complete, because many of the hospitals had difficulty in separating their financial reports by services. However, $40,000,751.80 was reported as the value of 10,487 beds, or $3,814.31 per bed. On this basis it is estimated that the 28,534 beds in the tuberculosis departments have a value of $108,837,730.69. Twelve preventoriums with a capacity of 515 beds indicated a cost of $1,033,765, or $2,007 per bed. Accordingly, the sum of $3,345,829 represents the valuation of the twenty-nine preventoriums that are operated as independent institutions.

An analysis was made of the sanatorium group to illustrate replacement costs on the basis of size and according to institutional control. This shows that the sanatoriums of less than twenty-five beds average $1,988 per bed, those of 25 to 49 beds $2,298, the institutions of from fifty to ninety-nine beds average $2,745, and the sanatoriums of 100 beds or over represent a valuation of $3,498 per bed.

The Veterans hospitals operated principally for the treatment of tuberculosis average approximately $4,000 per bed. The sanatoriums of the Indian Administration average $2,331, the state and local public sanatoriums are valued at $3,423 per bed, and the sanatoriums under private control represent a cost of $3,070 per bed. Some of the sanatoriums built within the last few years show a relatively high cost of construction, averaging around $10,000 per bed. The highest cost, $13,043 per bed, was reported by a nonfederal public sanatorium.

2. *Annual Maintenance Cost.*—Tuberculosis as an economic problem is of major significance, for the cost of tuberculosis hospitalization in the United States exceeds seventy million dollars a year. Five hundred and eight tuberculosis institutions, representing 73,089 beds, or 76.7 per cent of the total capacity, reported an annual maintenance cost of $55,234,882.25 exclusive of capital additions. On the basis of bed capacity, therefore, the maintenance cost would equal approximately $75,906,582.41 a year. In 410 sanatoriums with a capacity of 60,701 beds the annual maintenance cost was $42,822,213.06. This would indicate an expenditure of $45,852,869.22 for the entire group. Similarly it is estimated that the tuberculosis departments expend $29,311,492.05 annually and the preventoriums $742,221.14.

By computing the annual maintenance on the basis of the average daily per capita costs, results are obtained that substantiate these figures. Five hundred and ninety-two institutions reported a daily average of 69,042 patients, or 25,193,760 treatment days. In 563 other tuberculosis hospitals a day's census of patients was 12,910, which on an annual basis would equal 4,712,150 hospital days. Accordingly, at the average rate of $2.44 per patient daily, the cost of 29,905,910 treatment days amounts to $72,970,420.40. Furthermore, the same 1,155 institutions had 81,652 patients present on the day of reporting, and this number considered as a daily average would represent 29,802,980 treatment days and an annual maintenance cost of $72,719,271.20.

Operating expenditures exclusive of capital additions are presented by states in table 21.

3. *Daily Per Capita Costs.*—Reports from 410 sanatoriums, eighty-nine tuberculosis departments and fifteen preventoriums show that the tuberculosis institutions operate on an average daily per capita cost of $2.44. The sanatoriums average $2.37 daily, the tuberculosis departments $2.95, and the preventoriums $1.39. Federal hospitals for the treatment of tuberculosis have an average daily per capita cost of $3.20. In this group the Veterans Bureau hospitals average $3.98, the hospitals of the Indian Administration

Table 21.—Annual Maintenance Cost of Tuberculosis Institutions

(Exclusive of Capital Additions)

State	Reported Maintenance Cost										Estimated Maintenance Cost							Total Maintenance Cost All Institutions	
	Sanatoriums			Departments			Preventoriums				Sanatoriums		Departments		Preventoriums				
	Number Reporting	Beds Represented	Cost Reported	Number Reporting	Beds Represented	Cost Reported	Number Reporting	Beds Represented	Cost Reported	Total Maintenance Cost Reported	Additional Beds	Estimated Cost	Additional Beds	Estimated Cost	Additional Beds	Estimated Cost	Total Estimated Maintenance Cost	Number of Beds	Total Cost
Alabama	4	242	$ 112,858.63	..	...	$	..	...	$	$ 112,858.63	...	$	220	$ 225,995.00	...	$	$ 225,995.00	462	$ 338,853.63
Arizona	14	583	324,156.17	2	325	483,871.66	..	...	.....	808,027.83	222	156,612.12	378	388,300.50	10	4,450.00	549,362.62	1,518	1,357,390.45
Arkansas	2	556	270,635.80	..	...	.....	..	...	.....	270,635.80	...	.....	234	240,376.50	...	.....	240,376.50	790	511,012.30
California	25	3,425	2,429,755.54	15	1,762	1,733,580.92	3	119	39,595.87	4,202,932.33	591	416,926.86	1,193	1,225,509.25	299	133,055.00	1,775,491.11	7,389	5,978,423.44
Colorado	16	1,593	1,199,131.51	4	734	1,041,247.88	..	...	.....	2,240,379.39	150	105,819.00	214	219,831.50	...	.....	325,650.50	2,691	2,566,029.89
Connecticut	7	1,675	1,511,573.81	2	82	161,384.24	..	...	.....	1,672,958.05	...	.....	158	162,305.50	...	.....	162,305.50	1,915	1,835,263.55
Delaware	2	161	147,000.00	..	...	.....	..	...	.....	147,000.00	...	.....	...	.....	22	9,790.00	9,790.00	183	156,790.00
District of Columbia	2	370	79,490.85	1	100	46,219.95	..	...	.....	125,710.80	...	.....	196	201,341.00	...	.....	201,341.00	666	327,051.80
Florida	1	66	36,573.00	2	69	31,254.95	..	...	.....	67,827.95	20	14,109.20	129	132,515.25	46	20,470.00	167,094.45	330	234,922.40
Georgia	5	645	325,277.65	..	...	.....	1	13	3,084.76	328,362.41	...	.....	627	644,085.75	...	.....	644,085.75	1,285	972,448.16
Idaho	1	132	73,200.00	1	24	26,444.25	..	...	.....	99,644.25	...	.....	60	61,635.00	...	.....	61,635.00	216	161,279.25
Illinois	25	3,467	2,894,925.48	2	577	619,689.70	..	...	.....	3,514,615.18	11	7,760.06	1,325	1,361,106.25	24	10,680.00	1,379,546.31	5,404	4,894,161.49
Indiana	8	1,307	741,398.52	..	...	.....	..	...	.....	741,398.52	50	35,273.00	229	235,240.25	...	.....	270,513.25	1,586	1,011,911.77
Iowa	6	774	554,196.27	..	...	.....	..	...	.....	554,196.27	...	.....	207	212,640.75	...	.....	212,640.75	981	766,837.02
Kansas	3	388	263,217.88	..	...	.....	..	...	.....	263,217.88	...	.....	183	187,986.75	...	.....	187,986.75	571	451,204.63
Kentucky	3	574	521,940.82	..	...	.....	..	...	.....	521,940.82	375	264,547.50	257	264,003.25	...	.....	528,550.75	1,206	1,050,491.57
Louisiana	3	326	116,267.57	1	50	32,850.00	..	...	.....	149,117.57	...	.....	677	695,448.25	...	.....	695,448.25	1,053	844,565.82
Maine	4	482	419,610.12	..	...	.....	..	...	.....	419,610.12	...	.....	94	96,561.50	...	.....	96,561.50	576	516,171.62
Maryland	8	1,350	712,505.57	..	...	.....	..	...	.....	712,505.57	...	.....	200	205,450.00	...	.....	205,450.00	1,550	917,955.57
Massachusetts	21	3,478	3,210,815.51	9	834	1,216,450.25	1	30	22,398.24	4,449,664.00	585	412,694.10	423	434,526.75	...	.....	847,220.85	5,350	5,296,884.85
Michigan	22	3,329	2,005,637.35	4	994	836,470.66	..	...	.....	2,842,108.01	26	18,341.96	622	638,949.50	20	8,900.00	666,191.46	4,991	3,508,299.47
Minnesota	16	1,960	1,435,865.05	4	277	435,506.10	1	80	55,701.57	1,927,072.72	...	.....	568	583,478.00	...	.....	583,478.00	2,885	2,510,550.72
Mississippi	2	527	279,550.50	..	...	.....	..	...	.....	279,550.50	...	.....	245	251,676.25	...	.....	251,676.25	772	531,226.75
Missouri	6	1,244	681,282.48	1	67	42,796.25	..	...	.....	724,078.73	168	118,517.28	486	499,243.50	85	37,825.00	655,585.78	2,050	1,379,664.51
Montana	1	150	98,070.30	..	...	.....	..	...	.....	98,070.30	...	.....	110	112,997.50	...	.....	112,997.50	260	211,067.80
Nebraska	1	160	63,133.10	2	105	58,911.00	..	...	.....	122,044.10	...	.....	42	43,144.50	...	.....	43,144.50	307	165,188.60
Nevada	..	...	.....	..	...	.....	..	...	.....	.....	...	.....	18	18,490.50	...	.....	18,490.50	18	18,490.50
New Hampshire	2	210	152,973.66	..	...	.....	..	...	.....	152,973.66	...	.....	20	20,545.00	...	.....	20,545.00	230	173,518.66
New Jersey	13	2,393	2,164,873.57	3	363	252,216.85	..	...	.....	2,417,090.42	75	52,909.50	517	531,088.25	247	109,915.00	693,912.75	3,595	3,111,003.17
New Mexico	6	681	416,719.07	3	437	416,404.47	..	...	.....	833,123.54	189	133,331.94	246	252,703.50	...	.....	386,035.44	1,553	1,219,158.98
New York	53	9,116	8,117,306.43	11	2,117	2,494,885.39	2	42	16,950.60	10,629,142.42	534	376,715.64	2,563	2,632,841.75	210	93,450.00	3,103,007.39	14,582	13,732,149.81
North Carolina	12	1,965	1,431,116.40	..	...	.....	..	...	.....	1,431,116.40	487	343,559.02	173	177,714.25	...	.....	521,273.27	2,625	1,952,389.67
North Dakota	1	265	163,041.84	1	14	7,300.00	..	...	.....	170,341.84	...	.....	62	63,689.50	...	.....	63,689.50	341	234,031.34
Ohio	18	2,958	2,088,926.99	2	604	523,380.00	1	60	35,000.00	2,647,306.99	256	180,597.76	792	813,582.00	...	.....	994,179.76	4,670	3,641,486.75
Oklahoma	6	888	419,774.73	..	...	.....	..	...	.....	419,774.73	...	.....	188	193,123.00	...	.....	193,123.00	1,076	612,897.73
Oregon	3	474	263,532.21	..	...	.....	..	...	.....	263,532.21	39	27,512.94	109	111,970.25	...	.....	139,483.19	622	403,015.40
Pennsylvania	16	4,149	2,355,245.20	5	851	516,146.29	1	100	27,517.19	2,898,908.68	40	28,218.40	1,153	1,184,419.25	...	.....	1,212,637.65	6,293	4,111,546.33
Rhode Island	2	495	277,601.22	1	60	76,484.65	..	...	.....	354,085.87	...	.....	...	.....	50	22,250.00	22,250.00	605	376,335.87
South Carolina	6	539	232,213.18	2	120	37,219.78	..	...	.....	269,432.96	...	.....	16	16,436.00	...	.....	16,436.00	675	285,868.96
South Dakota	1	192	133,993.70	..	...	.....	..	...	.....	133,993.70	...	.....	105	107,861.25	...	.....	107,861.25	297	241,854.95
Tennessee	6	1,112	460,841.95	..	...	.....	1	50	11,233.00	472,074.95	12	8,465.52	398	408,845.50	...	.....	417,311.02	1,572	889,385.97
Texas	14	1,766	802,034.11	3	514	473,072.78	..	...	.....	1,275,106.89	205	144,619.30	380	390,355.00	...	.....	534,974.30	2,865	1,810,081.19
Utah	..	...	.....	1	32	21,500.00	..	...	.....	21,500.00	...	.....	22	22,599.50	...	.....	22,599.50	54	44,099.50
Vermont	2	127	94,137.20	..	...	.....	1	44	28,334.91	122,472.11	...	.....	...	.....	...	.....	.....	171	122,472.11
Virginia	7	1,123	581,181.68	1	52	17,280.00	..	...	.....	598,461.68	...	.....	250	256,812.50	...	.....	256,812.50	1,425	855,274.18
Washington	7	580	358,204.95	3	686	570,285.03	..	...	.....	928,489.98	171	120,633.66	94	96,561.50	...	.....	217,195.16	1,531	1,145,685.14
West Virginia	7	772	362,591.95	..	...	.....	..	...	.....	362,591.95	...	.....	77	79,098.25	...	.....	79,098.25	849	441,690.20
Wisconsin	20	1,899	1,405,802.54	..	...	.....	..	...	.....	1,405,802.54	90	63,491.40	392	402,682.00	116	51,620.00	517,793.40	2,497	1,923,595.94
Wyoming	1	33	32,031.00	..	...	.....	..	...	.....	32,031.00	...	.....	32	32,872.00	...	.....	32,872.00	65	64,903.00
Totals	410	60,701	$42,822,213.06	86	11,850	$12,172,853.05	12	538	$239,816.14	$55,234,882.25	4,296	$3,030,656.16	16,684	$17,138,639.00	1,129	$502,405.00	$20,671,700.16	95,198	$75,906,582.41

approximately $2.35, and the other federal hospitals $3.66. The state and local public institutions operate on an average daily per capita cost of $2.11, and the private institutions average $2.96 a day.

Considering the sanatoriums as a group, it was found that the lowest daily per capita cost was $0.50, the first quartle $1.73, the mean $2.20, the third quartle $2.73, and the highest cost $6.74. The federal sanatoriums average $2.75 per patient daily, the state sanatoriums $2.01, the county $2.10, the city $2.04, those under city and county control $1.74, and the private sanatoriums $2.94.

The tuberculosis departments, which frequently share in the maintenance of a complete hospital service, reflect a higher per capita cost. The lowest reported was $0.51, the mean $2.76, the highest daily per capita cost $8.96, and the average $2.95. Table 22 shows the low, mean, high, and average daily per capita costs of the sanatoriums and tuberculosis departments, the average of the preventoriums, and the average cost for all institutions.

Table 22.—Daily Per Capita Costs of Tuberculosis Institutions

	Sanatoriums						Departments							
Control	No. of Institutions Reporting	No. of Beds Represented	Low	Mean	High	Average	No. of Departments Reporting	No. of Beds Represented	Low	Mean	High	Average	Preventoriums, Average	All Institutions, Average
Federal	14	2,673	$1.46	$2.81	$4.57	$2.75	17	3,438	$1.98	$3.46	$5.73	$3.57	.....	$3.20
State	62	17,308	1.06	1.90	4.28	2.01	3	428	0.90	1.80	3.00	1.90	.....	2.00
County	162	19,462	0.50	2.12	5.18	2.10	25	2,464	0.51	2.29	4.14	2.20	$1.29	2.09
City	20	7,149	0.85	2.00	3.16	2.04	25	4,288	0.74	2.42	5.48	2.72	.....	2.42
City-county	15	2,423	0.92	1.61	2.91	1.74	2	495	2.87	....	3.00	2.96	1.31	1.82
Private	137	11,678	0.65	2.71	6.74	2.94	17	1,087	1.96	3.86	8.96	3.93	1.43	2.96
Totals	410	60,693	$0.50	$2.20	$6.74	$2.37	89	12,200	$0.51	$2.76	$8.96	$2.95	$1.39	$2.44

Table 23.—Sources of Income of Tuberculosis Institutions

	Number of Institutions Receiving Income from									
Type of Institution	Federal Government	State Funds	County Funds	City Funds	Fraternal Organizations	Industrial Agencies	Endowments	Gifts	Patients	Number of Institutions Reporting
Sanatoriums:										
Federal	18	...	...	..	..	..	..	..	...	18
State	1	65	14	5	3	1	1	1	19	65
County	1	55	173	7	2	..	3	8	52	173
City	2	3	1	22	..	..	..	..	2	22
City-county	..	1	15	15	..	..	..	2	4	15
Private	1	21	44	21	17	5	39	66	149	178
Totals	23	145	247	70	22	6	43	77	226	471
Departments:										
Federal	24	...	...	..	..	..	..	..	...	24
State	..	5	...	..	..	..	..	..	...	5
County	..	9	25	..	..	..	..	2	4	25
City	..	3	4	27	..	1	1	1	4	27
City-county	..	...	1	1	..	..	..	..	...	1
Private	..	4	6	2	2	1	3	3	15	19
Totals	24	21	36	30	2	2	4	6	23	101
Preventoriums:										
County	..	1	6	..	..	..	..	..	...	6
City-county	..	1	2	2	..	..	..	1	...	2
Private	..	2	3	3	..	..	5	20	5	21
Totals	..	4	11	5	..	..	5	21	5	29
Grand totals	47	170	294	105	24	8	52	104	254	601

4. *Sources of Income.*—In considering the cost of tuberculosis hospitalization it is of interest to analyze the sources of income of the various institutions and to determine the number of patients who paid for part or all of their hospital care. The analysis shown in table 23 is based on information from all the sanatoriums and the preventoriums and from 101 of the principal tuberculosis departments, in all 601 institutions. Forty-seven obtain part or all of their income from the federal government, 170 receive state funds, 294 county funds, 105 city support, twenty-four receive income from fraternal organizations, eight from industrial agencies, fifty-two from endowments, 104 from gifts, and 254 are supported in part or entirely by pay patients. Approximately 157 institutions have two sources of income, and 105 obtain their financial support from at least three different sources.

In the sanatorium group there are eighteen institutions maintained by the federal government and five civilian sanatoriums that receive federal aid. The states maintain sixty-five sanatoriums and contribute to the support of fifty-five county, three city, one city and county, and twenty-one private sanatoriums. The counties operate 173 sanatoriums and help to maintain seventy-four others, including fourteen state sanatoriums, one city, fifteen city and county, and forty-four under private control. City funds maintain twenty-two municipal sanatoriums and aid in the maintenance of five state, seven county, fifteen city and county, and twenty-one private sanatoriums. Endowments and gifts aid mainly the private sanatoriums, although a few state and county institutions receive aid from these sources. Eight sanatoriums are maintained by fraternal organizations, which also contribute to the support of sixteen others, and there are six sanatoriums receiving income from industrial agencies. Patients contribute toward the maintenance of nineteen state, fifty-two county, two municipal, four city and county, and 149 sanatoriums under private manage-

ment. One private sanatorium receives aid from the federal government, twenty-one state funds, forty-four county support, twenty-one city support, seventeen are aided by fraternal organizations, five by industrial agencies, and thirty-nine receive income from endowments, sixty-six from gifts, and 149 from patients. By reference to table 23, similar analyses can be made of the tuberculosis departments and the preventoriums. Practically all the preventoriums operated under private management receive part or all of their income from gifts, which include private donations, public subscriptions, income from seal sales, and funds obtained through the activities of women's auxiliaries, Junior League members, antituberculosis associations, the American Legion, community chest organizations, and other local agencies.

Table 24 reveals the paying status of patients. Data were obtained from 290 tax supported and 130 private institutions, representing a total of 81,583 patients, or 67 per cent of the admissions reported by all sanatoriums, tuberculosis departments and preventoriums. The tabulations indicate that 84.4 per cent of the patients receive free treatment, 9.2 per cent pay in part, and 6.4 per cent pay full rates. Of the 70,078 patients considered in the tax supported institutions, 63,856 received free care, 4,678 were part pay, and 1,544 full pay. The private institutions reported on the paying status of 11,505 patients. Of these, 4,964 received free care, 2,863 were part pay, and 3,678 paid full rates.

GROUP CLASSIFICATIONS

1. *Federal Tuberculosis Departments and Sanatoriums.*—The federal hospitals, although listed under one classification, constitute separate homogeneous groups serving a restricted population. Each group is under a single administration except in the case of the Indian hospitals, the general management of which is a function of the U. S. Department of the Interior and the medical supervision a responsibility of the U. S. Public Health Service.

In most of the federal services the tuberculosis problem remains fairly constant because of the continual replacement of personnel eligible for hospitalization, but in the Veterans Bureau the problem should decrease year by year and be self limited unless other classes of beneficiaries are added in the future.

In presenting a statistical analysis of the tuberculosis service in federal hospitals, it should be mentioned that part of the survey was affected by changes in various institutions incident to the federal economy regulations. Reallocation of services, transfer of patients, and other changes made it difficult at times to avoid a duplication of statistical data.

Tuberculosis patients were admitted in 169 federal hospitals, including sixty-five operated by the Veterans Bureau, fifty-two by the Indian Administration, twenty-six by the U. S. Public Health Service, thirteen by the U. S. Army, ten by the U. S. Navy, and three by other federal agencies. There are eighteen sanatoriums exclusively for tuberculosis and 151 departments, some of

Table 24.—Paying Status of Patients in Tuberculosis Institutions

State	Patients Admitted in Tax-Supported Institutions				Patients Admitted in Private Institutions				Patients Admitted in Both Groups			Number of Patients Considered	Percentage of Total Admissions
	Free	Part Pay	Full Pay	Total Patients	Free	Part Pay	Full Pay	Total Patients	Free	Part Pay	Full Pay		
Alabama	805	30	17	852	48	...	...	48	853	30	17	900	92
Arizona	1,191	...	...	1,191	71	217	178	466	1,262	217	178	1,657	75
Arkansas	572	192	17	781	...	...	...	...	572	192	17	781	94
California	5,869	191	25	6,085	20	338	396	754	5,889	529	421	6,839	68
Colorado	...	...	...	.....	717	64	141	922	717	64	141	922	37
Connecticut	17	467	...	484	6	99	119	224	23	566	119	708	42
Delaware	104	3	2	109	...	...	...	...	104	3	2	109	73
District of Columbia	651	2	2	655	...	...	...	...	651	2	2	655	59
Florida	109	...	...	109	...	...	...	...	109	...	...	109	12
Georgia	1,102	38	10	1,150	28	...	...	28	1,130	38	10	1,178	77
Idaho	216	...	...	216	...	...	...	...	216	...	...	216	75
Illinois	3,043	...	15	3,058	130	74	461	665	3,173	74	476	3,723	58
Indiana	734	208	250	1,192	...	...	...	...	734	208	250	1,192	70
Iowa	164	15	172	351	...	...	...	...	164	15	172	351	40
Kansas	426	...	...	426	...	...	...	...	426	...	...	426	57
Kentucky	1,462	64	54	1,580	...	...	...	...	1,462	64	54	1,580	84
Louisiana	274	...	...	274	170	28	23	221	444	28	23	495	59
Maine	...	...	...	.....	12	11	1	24	12	11	1	24	4
Maryland	1,512	2	15	1,529	39	2	...	41	1,551	4	15	1,570	76
Massachusetts	1,419	12	8	1,439	250	106	133	489	1,669	118	141	1,928	40
Michigan	2,549	8	91	2,648	9	3	286	298	2,558	11	377	2,946	50
Minnesota	1,162	57	65	1,284	105	10	34	149	1,267	67	99	1,433	54
Mississippi	...	...	...	.....	35	...	...	35	35	...	...	35	9
Missouri	1,829	17	25	1,871	240	187	29	456	2,069	204	54	2,327	67
Montana	196	...	...	196	...	...	...	...	196	...	...	196	60
Nebraska	203	16	...	219	...	...	...	...	203	16	...	219	56
Nevada	...	...	...	.....	...	...	...	...	.....	...	...	.....	..
New Hampshire	43	8	...	51	81	4	1	86	124	12	1	137	89
New Jersey	3,028	211	118	3,357	112	...	...	112	3,140	211	118	3,469	72
New Mexico	337	...	...	337	24	69	145	238	361	69	145	575	38
New York	16,229	301	264	16,794	1,617	672	404	2,693	17,846	973	668	19,487	83
North Carolina	1,534	628	29	2,191	4	84	124	212	1,538	712	153	2,403	84
North Dakota	210	...	17	227	...	...	...	...	210	...	17	227	76
Ohio	2,743	526	65	3,334	...	...	189	189	2,743	526	254	3,523	60
Oklahoma	1,108	3	15	1,126	5	40	47	92	1,113	43	62	1,218	73
Oregon	181	9	...	190	...	...	...	...	181	9	...	190	32
Pennsylvania	5,611	46	...	5,657	468	667	235	1,370	6,079	713	235	7,027	77
Rhode Island	455	72	3	530	27	5	...	32	482	77	3	562	66
South Carolina	412	24	6	442	51	26	...	77	463	50	6	519	68
South Dakota	103	...	...	103	...	...	...	...	103	...	...	103	30
Tennessee	392	60	...	452	221	14	60	295	613	74	60	747	62
Texas	2,442	217	98	2,757	130	131	523	784	2,572	348	621	3,541	76
Utah	41	3	...	44	...	...	...	...	41	3	...	44	35
Vermont	116	12	9	137	77	4	2	83	193	16	11	220	89
Virginia	423	426	11	860	123	6	27	156	546	432	38	1,016	61
Washington	845	91	11	947	...	1	100	101	845	92	111	1,048	71
West Virginia	73	606	61	740	83	1	...	84	156	607	61	824	89
Wisconsin	1,893	110	69	2,072	61	...	20	81	1,954	110	89	2,153	79
Wyoming	28	3	...	31	...	...	...	...	28	3	...	31	52
Totals	63,856	4,678	1,544	70,078	4,964	2,863	3,678	11,505	68,820	7,541	5,222	81,583	67

which are conducted principally for the treatment of tuberculous patients.

Apparently a large number of federal hospitals admit tuberculous patients for diagnosis and temporary care and transfer them later to institutions especially equipped for prolonged tuberculosis hospitalization. The U. S. Army, for example, transfers its tuberculous patients mainly to the Fitzsimons General Hospital, Denver, and the William Beaumont General Hospital, El Paso, Texas. The U. S. Navy has no hospital primarily for tuberculosis but utilizes the facilities of the army hospital in Denver. Twenty-six hospitals of the U. S. Public Health Service have departments for tuberculosis, but only one, the U. S. Marine Hospital, Fort Stanton, N. M., is operated exclusively for the treatment of tuberculous patients. In recent years the Veterans Bureau has decentralized its tuberculosis service to some extent, although it still operates thirteen hospitals principally for tuberculosis.

The U. S. Department of the Interior can be credited with marked improvements in the tuberculosis service for Indians. Since the survey began the department has opened three new sanatoriums in Arizona and New Mexico, and one has recently been completed in connection with the Minnesota State Sanatorium. Still other hospitals have recently been constructed for the Indian Administration, although not primarily for tuberculosis. The new sanatoriums have replaced old units closed or destroyed by fire within the last few years. Apparently there is need of further construction to replace some of the old sanatorium units still in use.

The number of beds for tuberculosis in the federal hospitals is 10,940, including 328 for children. The sanatoriums have 4,103 beds and the departments 6,837. The Veterans hospitals report 7,734 beds, the Indian hospitals 1,471, the U. S. Public Health Service 783, the U. S. Army 630, the U. S. Navy 176, and other federal institutions 146.

According to the accompanying tabulation there were 15,523 tuberculous patients admitted in the federal departments and sanatoriums, 10,406 discharged and 1,466 deaths. The average daily census of patients was 6,333 and there were 8,375 patients present on the day of reporting.

The federal sanatoriums include six Veterans hospitals, one operated by the U. S. Public Health Service, and eleven sanatoriums of the Indian Administration. They have a total capacity of 4,103 beds: 2,940 in the sanatoriums of the Veterans Bureau, 893 in the Indian service, and 270 in the tuberculosis sanatorium operated by the U. S. Public Health Service. The federal sanatoriums admitted 5,078 patients during a twelve months period, treated 7,719, discharged 4,617, and had 590 deaths. The average daily census was 3,179, and there were 3,442 patients present on the day of reporting. The waiting list totaled 150, although at the same time there were 676 vacancies. The average length of stay as reported by fifteen sanatoriums was 172 days.

Seventeen of the federal sanatoriums report facilities for pneumothorax and eighteen have equipment for minor surgery, fifteen for major surgery and thirteen for special chest surgery. Eleven maintain surgical affiliations with other hospitals. Dental departments are furnished in sixteen, including seven which have a full-time dental staff. All the federal sanatoriums have laboratory and x-ray facilities, seventeen have fluoroscopic and stereoscopic equipment, and eight have necropsy facilities. In necropsy performance the federal sanatoriums with a rate of 25 per cent are surpassed only by the municipal sanatorium group, which reports 37 per cent. The Indian sanatoriums report 16 per cent, the sanatorium operated by the U. S. Public Health Service 63 per cent, and the sanatoriums of the Veterans Bureau 25 per cent.

There is a considerable variation as regards medical personnel. The six Veterans hospitals exclusively for tuberculosis have eighty-one regular staff members, a ratio of 13.5 per institution. The sanatorium of the U. S. Public Health Service has six, and the Indian sanatoriums with fourteen regular staff members average only 1.3 per institution. There is considerable variation in the average size of the sanatorium groups, however, and on the basis of capacity the Veterans group has one physician to thirty-six beds, the Indian sanatoriums one to sixty-four, and the sanatorium of the U. S. Public Health Service one to forty-five. The ratio of physicians to patients is 1:52 in the Indian sanatoriums, 1:36 in the sanatorium of the U. S. Public Health Service, and 1:28 in the Veterans group.

The federal sanatoriums employ 330 graduate nurses. The ratio of nurses to patients is 1:9 in the Veterans group, 1:12 in the Indian sanatoriums, and 1:21 in the tuberculosis hospital of the U. S. Public Health Service. The total number of employees exclusive of physicians and dentists is 2,079: 1,686 in the Veterans sanatoriums, 146 in the Public Health Service hospital, and 247 in the sanatoriums of the Indian Administration.

Federal Departments and Sanatoriums

Control	Number of Sanatoriums	Capacity	Number of Departments	Capacity	Total Admissions	Patients Discharged	Number of Deaths	Patients Present	Daily Average
Veterans.....	6	2,940	59	4,794	10,493	7,969	1,250	5,772	4,445
Indian.....	11	893	41	578	2,633	1,271	67	1,266	1,028
Public health	1	270	25	513	738	263	47	608	398
Army.....	..	...	13	630	1,197	903	102	468	462
Navy.....	..	...	10	176	351	...	...	90	...
Other.....	..	...	3	146	111	...	...	171	...
Totals.....	18	4,103	151	6,837	15,523	10,406	1,466	8,375	6,333

The federal tuberculosis departments and sanatoriums, the total valuation of which is approximately $39,241,495.87, operate on an average daily per capita cost of $3.20 and have an annual maintenance cost of $10,553,236.85. The sanatoriums alone represent a valuation of $12,497,984.18. Their average daily per capital cost is $2.75 and their maintenance expenditure approximately $3,150,921.25 a year.

2. State Sanatoriums. — There are 65 state sanatoriums with a total capacity of 17,308 beds: 13,333 for adults, 3,170 for children, and 805 unassigned. The institutions vary in size from thirty-two to 1,035 beds and have an average capacity of 266 beds. Twelve states are without a state sanatorium, twenty-one states have one each, six have two, five have three, Maryland, Massachusetts and New York have four each, and Connecticut has five. Three of the sanatoriums in New York were not in operation at the time of the survey.

The total valuation of the state sanatoriums is $51,046,657.48, based on the general average of $2,949.31 per bed. These institutions operate on an average daily per capita cost of $2.01 and expend annually about $11,559,389.40.

Four hundred and three physicians are connected with the state sanatoriums: sixty-one full-time medical

directors, four part-time medical directors, 187 full-time staff physicians, and 151 attending and consulting physicians. With a regular staff of 252 physicians, the sanatoriums average four physicians per institution and one for every sixty-two patients.

The state sanatoriums have 8,084 other employees: 917 graduate nurses, 308 student nurses, six affiliates, 615 practical nurses, fifty dietitians, seven graduate pharmacists, 113 record clerks, sixty-five x-ray technicians, seventy-nine laboratory technicians, twenty occupational therapists, seventy-five school teachers, eleven social service workers, twenty-five field nurses and 4,551 general employees. The reports show that graduate nurses are employed in sixty-one sanatoriums, practical nurses in forty-one, x-ray technicians in fifty-three, laboratory technicians in fifty, dietitians in forty, and graduate pharmacists in seven. Record clerks are employed in forty-four, occupational therapists in nine-

toriums have a low necropsy percentage: 2,116 deaths and 227 necropsies (11 per cent).

As shown in table 25 the state sanatoriums admitted 19,028 patients: 13,390 adults, 3,541 children, and 1,557 not classified. There were 34,623 patients treated, 18,406 discharged, 15,947 patients present on the day of reporting, and a daily average of 15,756 throughout the year. The average length of stay was 166 days. There were 1,361 vacancies, and the waiting list totaled 6,108.

3. *County Sanatoriums.* — The county sanatoriums constitute the largest group of tuberculosis institutions. They number 173 and have a total capacity of 20,114 beds: 16,029 for adults, 3,165 for children and 920 unassigned. The variation in bed capacity is from ten to 917 beds and the average capacity 116.

These institutions admitted 20,845 patients: 14,128 adults, 3,764 children and 2,953 not classified. They

Table 25.—State Sanatoriums Classified by States

State	Number of Sanatoriums	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Number of Deaths	Patients Treated	Patients Present	Waiting List	Daily Average
		Adults	Children	Total	Adults	Children	Total						
Arkansas	2	468	88	556	594	155	749	771	41	1,315	564	171	555
Connecticut	5	1,041	442	1,483	807	236	1,043	1,027	229	2,367	1,330	164	1,314
Delaware	2	117	44	161	77	32	109	93	31	233	139	60	129
Georgia	1	224	113	337	701	255	956	674	43	956	293	545	280
Indiana	1	117	94	211	103	86	189	182	4	371	206	150	200
Iowa	1	363	...	363	213	...	213	222	58	575	353	75	340
Kansas	1	236	32	268	163	36	199	191	26	452	264	88	264
Kentucky	1	80	...	80	146	...	146	98	7	178	74	1,725	51
Louisiana	1	96	...	96	85	6	91	79	16	178	89	79	88
Maine	3	371	81	452	220	42	467*	486	83	895	410	21	429
Maryland	4	715	126	896*	844	128	1,184*	1,161	209	2,042	894	107	887
Massachusetts	4	476	765	1,241	484	480	964	1,011	116	2,139	1,104	...	1,146
Michigan	2	781	85	866	327	30	357	404	78	1,017	628	113	642
Minnesota	1	390	...	390	278	...	278	263	56	525	265	4	277
Mississippi	1	...	...	480	273	87	360	332	29	649	317	...	310
Missouri	1	356	49	405	431	35	466	434	53	798	388	88	335
Montana	1	120	30	150	159	37	196	202	36	346	136	56	137
Nebraska	1	127	33	160	159	...	159	160	21	317	157	25	154
New Hampshire	1	110	...	110	51	...	51	64	7	147	93	3	90
New Jersey	1	300	120	420	383	139	522	558	18	927	406	37	441
New York	4†	300	...	300	...	...	482	473	15	770	297	50	301
North Carolina	1	416	68	484	547	59	606	559	24	1,043	459	174	435
North Dakota	1	215	50	265	162	38	200	174	29	428	249	97	239
Ohio	1	240	...	240	399	...	399	399	...	631	232	...	231
Oklahoma	3	535	68	603	802	63	865	820	108	1,729	577	352	566
Oregon	2	139	...	409*	258	35	293	275	61	679	403	90	398
Pennsylvania	3	1,930	485	2,415	1,804	1,008	2,812	2,699	296	4,958	2,403	1,090	2,331
Rhode Island	1	363	67	430	340	40	380	383	65	794	388	7	415
South Carolina	1	229	48	277	210	57	267	267	31	492	225	...	254
South Dakota	1	192	...	192	101	...	101	93	20	398	205	38	160
Texas	1	556	162	718	1,597	347	1,944	1,935	26	2,647	697	373	692
Vermont	2	127	...	127	137	...	137	129	38	243	116	13	113
Virginia	3	720	40	760	299	58	952*	880	117	1,622	703	168	684
West Virginia	3	568	80	648	549	52	664*	666	85	1,248	603	121	583
Wisconsin	2	282	...	282	196	...	196	211	30	468	251	24	257
Wyoming	1	33	...	33	31	...	31	31	10	46	29	...	28
Totals	65	13,333	3,170	17,308*	13,930	3,541	19,028*	18,406	2,116	34,623	15,947	6,108	15,756

* Partly unclassified.
† Three not in operation at time of survey.

teen, school teachers in thirty-four, social service workers in eight, and field nurses in two of the sanatoriums. The total nursing staff is 1,846 and the ratio of nurses to patients 1:9.

Fifty-nine sanatoriums report facilities for pneumothorax, fifty-eight for minor surgery, twenty-one for general major surgery, and twenty-six for special chest surgery. Forty-six maintain surgical affiliations with other hospitals. Dental departments are furnished in forty-eight institutions, eight of which have a full-time staff. Roentgenographic equipment is available in fifty-nine, fluoroscopic facilities in fifty-nine, clinical laboratory departments in fifty-eight, and necropsy facilities in thirty. Fifty-five sanatoriums refer part of their laboratory work and three have affiliations for x-ray service. Fifty-nine sanatoriums, which admitted 18,434 patients, reported 121,654 roentgen examinations and 87,416 fluoroscopic studies. Similarly, fifty-one sanatoriums with 17,227 admissions had 413,106 laboratory examinations. As a group, the state sana-

treated 38,000, discharged 19,827 and had 4,017 deaths. They maintained a daily average of 18,364 and had 18,440 patients present on the day of reporting. The waiting list totaled 1,637 patients while, at the same time, there were 1,674 vacancies. The average length of stay in this group was 173 days.

The county sanatoriums are served by a regular staff of 360 physicians—approximately two per institution. There are 106 full-time medical directors and sixty-seven part-time and 187 resident physicians on a full-time basis. The ratio of physicians to patients is 1:51, not counting a group of 813 attending or consulting physicians.

The nursing staff has 2,558 members: 1,499 graduates, 126 student nurses, sixty-six affiliates and 867 practical nurses. The ratio of nurses to patients is therefore, approximately 1:7. Graduate nurses are employed in 167 county sanatoriums and practical nurses in 128. The total number of employees is 8,084 exclusive of physicians and dentists. The personnel

for special departments includes eighty-one dietitians, seven graduate pharmacists, 145 record clerks, 104 x-ray technicians, 119 laboratory technicians, fifty-four occupational therapists, 118 school teachers, forty-four social service workers and ninety-eight field nurses. Laboratory technicians are employed in 100 institutions, x-ray technicians in ninety-five, dietitians in seventy-one, graduate pharmacists in seven, record clerks in ninety-seven, occupational therapists in fifty-two, school teachers in seventy-five, social service workers in twenty-seven, and field nurses in sixty-five of the county sanatoriums.

One hundred and sixty sanatoriums have facilities for pneumothorax and 139 have equipment for minor surgery, fifty-one for major surgery and fifty-nine for special chest surgery. A surgical affiliation is maintained in 130. Dental departments are reported in 114 institutions, including six which have a full-time dental staff. General roentgenographic equipment is furnished in 144 sanatoriums, fluoroscopic facilities in 142 and stereoscopic equipment in 132. Thirty-five institutions refer part or all of their x-ray work to other hospitals. In 169 of the sanatoriums there were 18,988 patients admitted, 165,864 roentgen examinations, and 129,192 fluoroscopic studies. Laboratory facilities are available in 144 institutions and necropsy facilities in fifty-two. One hundred and forty-nine county sanatoriums refer part or all of their laboratory work. In 112 institutions reporting 16,809 patients admitted there were 436,562 laboratory examinations performed, or twenty-six per patient. The necropsy rate is 15 per cent: 4,017 deaths and 635 necropsies.

The financial reports indicate that the county sanatorium group operates on an average daily per capita cost of $2.10 and has an annual maintenance expenditure of approximately $14,076,006. The total valuation of the county sanatoriums at $3,737.64 per bed is $75,178,890.96.

4. *Municipal Sanatoriums.* — Municipally owned sanatoriums are confined to the District of Columbia and the states of Illinois, Maryland, Massachusetts, Michigan, Missouri, New York, Ohio, Pennsylvania and Virginia. There are twenty-two city sanatoriums, with a capacity of 7,365 beds: 6,171 for adults, 1,001 for children and 193 unassigned. These institutions vary in size from eighteen to 1,446 beds and the average capacity is 335 beds. Together, they represent a valuation of $29,701,719.30, or $4,032.82 per bed. The annual maintenance cost of this group is approximately $5,381,224.20, with an average daily per capita cost of $2.04.

Pneumothorax facilities are provided in seventeen of these sanatoriums, and equipment for minor surgery in sixteen, for general major surgery in eleven and for special chest surgery in nine. Sixteen institutions maintain surgical affiliations with other hospitals. Four of the sanatoriums that report a dental department have a full-time dental staff. General roentgenographic equipment is furnished in eighteen institutions, fluoroscopic facilities in seventeen, stereoscopic equipment in fifteen and clinical laboratory facilities in nineteen. Ten municipal sanatoriums have necropsy facilities. The necropsy rate, 37 per cent, is the highest percentage in any of the sanatorium groups.

Table 26.—County Sanatoriums Classified by States

State	Number of Sanatoriums	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Number of Deaths	Patients Treated	Patients Present	Waiting List	Daily Average
		Adults	Children	Total	Adults	Children	Total						
Alabama	3	146	36	182	225	13	238	224	63	353	138	62	129
Arizona	2	82	...	82	70	2	72	60	15	102	79	...	80
California	10	1,636	503	2,300*	1,363	410	2,006*	2,000	291	4,202	2,147	127	2,198
Florida	2	76	...	76	48	...	48	36	9	111	68	22	60
Georgia	1	30	...	30	27	...	27	25	...	38	25	...	26
Illinois	16	1,181	137	1,486*	1,225	85	1,310	1,293	299	2,478	1,178	171	1,153
Indiana	8	938	208	1,146	720	349	1,353*	1,371	214	2,392	1,045	121	982
Iowa	4	301	30	331	221	23	357*	363	70	618	277	8	239
Kansas	1	60	...	60	...	...	67	52	19	104	41	...	48
Kentucky	1	68	22	90	116	...	116	111	12	206	93	3	91
Massachusetts	7	1,128	26	1,176*	882	6	991*	962	275	2,073	1,101	89	1,108
Michigan	11	500	109	809*	475	147	887*	838	133	1,459	698	45	717
Minnesota	13	1,328	89	1,494*	782	96	1,094*	1,084	203	2,582	1,458	57	1,443
Missouri	2	118	...	118	110	...	131*	117	56	162	120	29	117
New Jersey	9	1,599	218	1,817	1,473	450	2,287*	2,216	668	4,042	1,731	77	1,719
New York	28	2,248	827	3,075	2,233	1,331	3,792*	3,758	560	6,556	2,837	125	2,892
North Carolina	7	386	70	486*	333	55	434*	395	67	788	415	47	433
Ohio	14	1,639	539	2,178	1,579	316	2,261*	2,024	500	4,098	2,144	279	2,019
Oregon	1	...	...	39	...	...	65	...	...	...	...	...	39
Pennsylvania	3	263	74	337	342	70	412	411	104	745	334	58	332
South Carolina	3	96	16	166*	112	14	226*	98	22	211	98	89	160
Tennessee	1	249	51	300	196	83	279	279	51	501	228	95	230
Texas	2	84	18	102	115	11	126	135	31	222	102	5	96
Washington	5	333	67	575*	356	68	521*	461	56	946	521	47	509
West Virginia	2	44	5	49	...	...	73	56	10	80	45	6	41
Wisconsin	17	1,406	120	1,610*	1,125	235	1,672*	1,458	289	2,936	1,517	75	1,508
Totals	173	16,029	3,165	20,114*	14,128	3,764	20,845*	19,827	4,017	38,000	18,440	1,637	18,364

* Partly unclassified.

One hundred and two physicians are connected regularly with the municipal sanatoriums—twelve medical directors on full-time duty, ten on part-time, and eighty full-time resident physicians. The ratio of physicians to patients is 1:70 and the average staff membership is 4.6 per institution.

The nursing staff in this sanatorium group totals 1,045:629 graduates, eighteen affiliates and 398 practical nurses. With an average daily census of 7,227, the ratio of nurses to patients is approximately 1:7. The total number of employees is 3,920 exclusive of physicians and dentists. There are twenty-four dietitians employed, eight graduate pharmacists, twenty-nine record clerks, fourteen x-ray technicians, twenty-seven laboratory technicians, fourteen occupational therapists, fifteen school teachers, eight social service workers and 160 field nurses.

The municipal sanatoriums admitted 8,346 patients, treated 15,403, discharged 8,307 and had 1,716 deaths. The daily average according to table 27 was 7,227, and on the day of reporting there were 7,014 patients present. There were 351 vacancies and 228 patients on the waiting list. The average length of stay in this sanatorium group is 170 days per patient.

5. *City-County Sanatoriums.*—The city-county institutions constitute the smallest sanatorium group. The sanatoriums, fifteen in all, are located in California, Georgia, Illinois, Kansas, Kentucky, New York, Ohio, Pennsylvania, South Carolina, Tennessee and Texas. Georgia has two, Tennessee two, Texas three, and the other states one each. These institutions vary in size from twenty-four to 462 beds and have an average bed capacity of 161. Their total capacity is 2,423 beds: 1,919 for adults, 480 for children and twenty-four unassigned.

The valuation of the city-county group is reported as $6,369,848.93, or $2,628.91 per bed, and the annual maintenance cost is approximately $1,466,445.90. The average daily per capita cost is $1.74.

The regular medical staff has thirty-nine members, or 2.6 per institution. The ratio of physicians to patients is 1:60. The medical director serves on a full-time basis in eight of the sanatoriums.

The nursing staff totals 258 and includes 123 graduates and 135 practical nurses. On the basis of a daily average census of 2,309, the ratio of nurses to patients is 1:9. The total number of employees is 1,023 and includes ten dietitians, one graduate pharmacist, eight record clerks, nine x-ray technicians, ten laboratory technicians, two occupational therapists, fifteen school teachers, three social service workers and nine field nurses.

Twelve municipal sanatoriums have facilities for pneumothorax and eleven are equipped for minor surgery, two for general major surgery and five for special chest surgery. Twelve institutions maintain surgical affiliations. Dental departments are furnished in nine sanatoriums, but only one has a full-time dental staff. Ten institutions supply roentgenographic equipment, eleven have fluoroscopic facilities, nine have stereoscopic equipment, and five refer x-ray work to other hospitals. Laboratory equipment is provided in ten of the city-county sanatoriums and necropsy facilities in two. The necropsy rate is only 10 per cent: 573 deaths and fifty-eight necropsies.

A summary of the statistical data as represented in table 28 shows that there were 2,824 patients admitted, 5,113 treated, 2,813 discharged and 573 deaths. The average length of stay in the city-county sanatoriums was 165 days. There were 392 patients on the waiting list and 107 vacancies. The daily average was 2,309, a figure similar to the census of 2,316 patients on the day of reporting.

6. *Private Sanatoriums.*—The private sanatoriums comprise a heterogeneous group. They represent several types of ownership and control and vary greatly in size, type of construction and equipment. In completeness of hospital service they differ widely. Some are hardly beyond the nursing home stage; others, on the contrary, are equipped and staffed to offer a complete and scientific sanatorium service. A few have also gained national prominence because of their scientific accomplishments and their contributions to the progress of medicine.

There are in all 178 private sanatoriums, with a total capacity of 13,684 beds: 8,731 for adults, 892 for children and 4,061 unassigned. They have an average capacity of seventy-seven beds, the lowest of any group, and vary in size from eight to 487 beds. The capacity is less than twenty-five beds in twenty-eight institutions, from twenty-five to forty-nine beds in forty-four, from fifty to ninety-nine beds in fifty-six, and 100 beds or over in fifty.

One hundred and forty-one sanatoriums which have facilities for pneumothorax report a total of 76,708 treatments. There is equipment for minor surgery in 122, for major surgery in thirty-eight, and for special chest surgery in forty. On the other hand, 118 sanatoriums maintain surgical affiliations. Seventy-three institutions have dental departments, with four main-

Table 27.—Municipal Sanatoriums Classified by States

State	Number of Sanatoriums	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Number of Deaths	Patients Treated	Patients Present	Waiting List	Daily Average
		Adults	Children	Total	Adults	Children	Total						
District of Columbia	2	220	150	370	210	122	332	209	84	546	355	30	285
Illinois	2	1,140	159	1,299	907	934	1,841	1,918	228	3,096	1,273	17	1,218
Maryland	1	179	...	179	452	...	452	394	170	557	163	5	163
Massachusetts	4	744	...	744	552	...	696*	652	255	1,386	733	20	724
Michigan	2	675	160	980*	601	187	788	805	75	1,741	940	...	941
Missouri	2	632	36	668	534	...	534	526	154	1,189	662	...	653
New York	5	2,081	428	2,509	2,811	334	3,145	3,281	635	5,855	2,380	90	2,687
Ohio	1	...	...	48	...	...	32	...	...	...	...	...	44
Pennsylvania	1	246	44	290	221	52	273	281	69	549	278	66	275
Virginia	2	254	24	278	114	16	253*	241	46	484	230	...	237
Totals	22	6,171	1,001	7,365*	6,402	1,645	8,346*	8,307	1,716	15,403	7,014	228	7,227

* Partly unclassified.

Table 28.—City-County Sanatoriums Classified by States

State	Number of Sanatoriums	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Number of Deaths	Patients Treated	Patients Present	Waiting List	Daily Average
		Adults	Children	Total	Adults	Children	Total						
California	1	82	...	82	93	...	93	85	...	166	81	...	80
Georgia	2	178	40	242*	...	...	212	186	66	428	227	207	231
Illinois	1	110	...	110	92	9	101	122	16	215	104	20	99
Kansas	1	50	10	60	73	87	160	158	15	198	43	6	42
Kentucky	1	314	90	404	434	88	522	506	116	1,003	500	45	502
New York	1	83	52	135	75	31	106	104	28	240	132	3	135
Ohio	1	354	108	462	335	121	456	454	34	879	423	27	419
Pennsylvania	1	55	2	57	95	4	99	103	15	153	53	18	53
South Carolina	1	26	...	26	...	...	31	28	6	53	24	4	20
Tennessee	2	385	118	503	332	73	405	409	147	816	400	32	408
Texas	3	282	60	342	533	106	639	658	130	962	329	30	320
Totals	15	1,919	480	2,423*	2,062	519	2,824*	2,813	573	5,113	2,316	392	2,309

* Partly unclassified.

taining a full-time dental staff. X-ray equipment is furnished in 115 of the private sanatoriums, fluoroscopic facilities in 122, and stereoscopic equipment in ninety-two. Fifty-six refer x-ray work to other hospitals. In 152 institutions there were 10,090 patients admitted, 62,605 x-ray examinations carried out, and 65,892 fluoroscopic studies.

Laboratory facilities are furnished in 115 sanatoriums and necropsy facilities in twenty-two. Eighty institutions reported 9,104 patients admitted and a total of 208,904 laboratory examinations. The private institutions show the lowest necropsy rate of any sanatorium group; namely, 9 per cent: 1,911 deaths and 173 necropsies.

In the private sanatoriums the ratio of physicians to patients is 1:32. The regular staff of 300 members includes sixty-eight medical directors on full-time duty, ninety on part-time duty and 142 resident physicians.

The valuation of the private sanatorium group is $42,022,469.28, or $3,070.92 per bed. These institutions operate on an average daily per capita cost of $2.94 and expend annually about $10,183,719.

7. Tuberculosis and Isolation Hospitals.—Twenty-six "tuberculosis and isolation" hospitals are included in the list of tuberculosis departments. Many of them are operated principally for the treatment of tuberculosis and might well be listed as sanatoriums were it not for the fact that the sanatorium classification has been reserved for those institutions which treat tuberculosis only.

Table 30, which lists each institution by name and also the principal features of the tuberculosis service, shows that the tuberculosis and isolation hospitals have a total capacity of 2,556 beds: 2,131 for adults, 137 for children and 288 unassigned. The admissions for a year total 4,456 including 2,280 adults, 128 children

Table 29.—Private Sanatoriums Classified by States

State	Number of Sanatoriums	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Number of Deaths	Patients Treated	Patients Present	Waiting List	Daily Average
		Adults	Children	Total	Adults	Children	Total						
Alabama	1	60	...	60	45	3	48	52	21	89	37	...	33
Arizona	12	150	30	467*	235	49	454*	298	35	457	201	6	192
California	24	490	18	1,390*	1,026	5	1,524*	1,017	136	1,827	960	40	908
Colorado	17	1,025	112	1,743*	736	80	1,137*	1,139	132	2,096	1,034	130	1,033
Connecticut	2	192	...	192	76	...	271*	262	4	440	170	...	173
Florida	1	...	...	10	...	...	...	...	...	...	5	...	...
Georgia	1	36	...	36	26	1	27	25	...	36	16	...	16
Illinois	7	348	32	583*	576	43	668*	620	64	983	358	6	351
Louisiana	2	200	30	230	189	17	206	171	62	283	101	...	110
Maine	1	30	...	30	24	...	24	29	2	44	15	...	14
Maryland	3	227	48	275	86	...	320*	302	53	556	259	27	252
Massachusetts	7	273	44	430*	225	20	272*	278	34	509	239	7	238
Michigan	8	638	62	700	682	21	703	632	197	1,278	598	...	611
Minnesota	2	76	...	76	53	...	82*	69	9	78	22	...	35
Mississippi	1	47	...	47	35	...	35	41	14	69	28	...	30
Missouri	2	189	32	221	26	33	267*	248	60	416	170	16	169
New Hampshire	1	75	25	100	...	...	86	77	10	168	85	...	86
New Jersey	6	174	...	231*	166	1	231*	180	19	317	125	50	143
New Mexico	5	230	10	440*	152	...	365*	253	31	346	221	...	219
New York	20	2,416	155	2,632*	2,392	110	3,281*	3,110	585	5,324	2,243	53	2,387
North Carolina	14	149	...	632*	68	1	493*	166	25	361	273	5	306
Ohio	4	252	16	286*	147	...	296*	215	51	430	219	2	199
Oklahoma	1	...	...	60	90	2	92	90	4	107	19	...	14
Oregon	1	...	...	65	104	...	104	110	...	148	38	...	31
Pennsylvania	9	765	97	1,090*	951	41	1,617*	1,532	155	2,338	818	72	817
Rhode Island	1	65	...	65	32	...	32	29	14	77	47	2	47
South Carolina	1	70	...	70	41	...	41	44	4	76	40	13	30
Tennessee	4	179	90	321*	202	67	295*	276	64	547	259	27	253
Texas	11	270	...	809*	665	11	976*	661	71	881	529	...	491
Virginia	2	40	20	85*	104	52	156	171	6	240	69	4	64
Washington	3	16	...	136*	233	3	236	237	33	317	74	...	87
West Virginia	2	24	51	75	23	21	60*	44	5	113	70	6	68
Wisconsin	2	25	20	97*	75	6	81	75	11	153	78	1	83
Totals	178	8,731	892	13,684*	9,485	587	14,480*	12,453	1,911	21,104	9,420	476	9,490

* Partly unclassified.

Other attending or consulting physicians increase the entire staff membership to 1,217.

The nursing staff totals 1,324: 760 graduates, 104 students, fifty affiliates and 410 practical nurses. An average daily census of 9,490 indicates that the ratio of nurses to patients is approximately 1:7. Other trained personnel includes seventy-four dietitians, twenty-three graduate pharmacists, 110 record clerks, eighty-four x-ray technicians, ninety laboratory technicians, twenty-eight occupational therapists, thirty-two school teachers, nineteen social service workers and eleven field nurses. The total number of employees exclusive of physicians and dentists is 4,567.

Table 29 shows that the private sanatoriums admitted 14,480 patients: 9,485 adults, 587 children and 4,408 not classified. There were 21,104 patients treated, 12,453 discharged and 1,911 deaths. The average length of stay was considerably less than in other sanatorium groups, 151 days. The private sanatoriums had 9,420 patients present on the day of reporting, a waiting list of 476, and 4,264 vacancies.

and 2,048 unclassified. There were 3,952 patients discharged, 2,306 patients were present on the day of reporting, and the average daily census was 2,134.

Twelve of the hospitals have a full-time staff of forty-five physicians, seventeen employ 459 graduate nurses, and ten are also served by a group of seventy-five student, affiliate and practical nurses. The total number of employees in seventeen of the principal hospitals is 1,410, exclusive of physicians.

Eighteen hospitals in this group have laboratory departments, fifteen have x-ray equipment, and fourteen have fluoroscopic facilities. Apparatus for the administration of artificial pneumothorax is furnished in fourteen.

8. Tuberculosis Departments of General Hospitals.—As shown in the early part of this report, there are 418 tuberculosis departments connected with general hospitals. A considerable number are regular sanatorium units operated in conjunction with the main hospital service. Eighty-six hospitals have separate buildings for tuberculosis; in 175 the tuberculosis

departments occupy separate wards or floors, but in 157 the degree of segregation is not known. Three hundred and eleven departments of general hospitals have a capacity of less than twenty-five beds, thirty-eight vary from twenty-five to forty-nine beds, thirty-three have from fifty to ninety-nine beds, and in thirty-six the capacity is 100 beds or over.

Table 31 lists ninety-three of the principal tuberculosis departments of general hospitals which were requested to supply the special data included in the tuberculosis questionnaire. These institutions have a total capacity of 11,942 beds: 9,551 for adults, 701 for children and 1,690 unassigned. They admitted 26,128 patients including 20,583 adults, 885 children and 4,660 not classified. There were 24,627 patients discharged during a twelve months period. This group of hospitals maintained a daily average of 8,927 and on the day of reporting had 9,664 patients under treatment.

Seventy hospitals reported a full-time staff of 373 physicians, an average of five per institution. The total number of employees exclusive of physicians is 6,785 and includes 1,406 graduate nurses and 717 student, affiliate and practical nurses. These figures cannot be used for comparative purposes, however, for some of the institutions included the entire hospital personnel, whereas others listed only the employees attached to the tuberculosis service.

Eighty-six of this group have x-ray, fluoroscopic and pneumothorax facilities. Laboratory equipment is furnished in eighty-nine.

In all, the tuberculosis departments of general hospitals have a capacity of 14,601 beds. They admitted 37,079 patients during a twelve months period and had 11,318 patients under treatment on the day of reporting.

SUMMARY

1. *General Statement.*—The main purpose of this report has been to present to the medical profession a picture of the tuberculosis hospitalization in the United States. The study, therefore, has not dealt with the sanatoriums alone but has been concerned with the extent to which tuberculosis activities have developed in other hospital fields.

Throughout the survey, every effort was made to obtain as accurate information as possible. The inspection reports were supplemented by a comprehensive tuberculosis questionnaire and the data on the hospitalization of children were later rechecked to determine accurately the classes of patients admitted.

The report is mainly a compilation of factual data and lends itself to comparative studies on the basis of previous surveys. It does not attempt to cover every phase of the tuberculosis service but deals mostly with features that can readily be subjected to a statistical analysis.

This report is presented in the hope that it will be useful to the medical profession, the hospital field and those who are intimately connected with the tuberculosis service in the United States. The completeness of the report is in a large measure due to the loyal and harmonious cooperation of the American Sanatorium Association, the National Tuberculosis Association and the hospital and sanatorium superintendents, who so generously responded with an unprecedented record of 98.9 per cent returns.

2. *Extent of Tuberculosis Hospitalization.*—The report is based on information supplied by 6,200 hospitals including 471 sanatoriums, 740 tuberculosis departments and twenty-nine preventoriums. The total capacity for tuberculosis is 95,198 beds: 64,997 in the sanatoriums, 28,534 in the tuberculosis departments and 1,667 in the preventorium group.

The sanatoriums, tuberculosis departments and preventoriums admitted 121,706 patients during a twelve months period. The number of patients discharged is approximately 118,700 on the basis of 97,381 patients discharged in institutions representing 82 per cent of the bed capacity. The average daily census of patients receiving treatment for tuberculosis is approximately 82,000 for institutions representing 97 per cent of the bed capacity reported 81,652 patients under treatment. Similarly, from the daily average reported it is esti-

Table 30.—Tuberculosis-Isolation Hospitals

Name	Location	Bed Capacity for Tuberculosis			Patients Admitted			Patients Discharged	Patients Present	Daily Average	Full-Time Staff				X-Ray Facilities	Fluoroscopic Facilities	Laboratory Facilities	Pneumothorax Facilities
		Adults	Children	Total	Adults	Children	Total					Graduate Nurses	Other Nurses	Other Employees				
Englewood Hospital	Bridgeport, Conn..	34	6	40	89	3	92	95	24	36	2	18	1	21	No	No	Yes	No
Municipal Hospital	Greenwich, Conn...	16	..	16	21	..	21	21	..	8	..	7	1	9	No	No	No	No
Board of Health Hospital	Brookline, Mass...	..	..	30	..	..	22	19	22	20	..	5	1	6	No	No	Yes	Yes
Lowell Tuberculosis Hospital	Lowell, Mass.....	54	..	54	75	4	79	67	51	46	..	13	..	18	Yes	Yes	No	Yes
Malden Contagious Hospital	Malden, Mass.....	..	..	16	..	..	40	..	10	..	..	..	..	..	No	No	No	....
Barnstable County Sanatorium	Pocasset, Mass....	28	..	28	..	..	177	142	41	39	2	7	..	12	Yes	Yes	Yes	Yes
Somerville Contagious Hospital	Somerville, Mass...	..	..	20	..	..	3	..	..	..	..	..	..	..	No	No	No	....
Health Department Hospitals	Springfield, Mass..	46	..	46	70	..	70	66	40	35	..	9	..	10	Yes	No	Yes	Yes
Belmont Hospital	Worcester, Mass...	150	..	150	..	..	199	194	104	114	3	35	..	15	Yes	Yes	Yes	Yes
Herman Kiefer Hospital	Detroit.....	761	..	761	..	..	1,357	1,292	741	720	15	178	26	237	Yes	Yes	Yes	Yes
Fairmount Hospital	Kalamazoo, Mich..	64	11	75	62	14	76	71	52	55	1	6	8	24	Yes	Yes	Yes	Yes
Saginaw County Contagious Hosp...	Saginaw, Mich.....	..	..	25	..	..	54	..	24	..	..	..	..	..	No	No	No	....
Sunnyslope Hospital	St. Joseph, Mo.....	..	..	9	..	..	12	..	..	..	..	..	..	..	No	No	Yes	....
City Isolation Hospital	St. Louis.....	67	..	67	131	..	131	133	67	67	1	3	7	100	Yes	Yes	Yes	Yes
Detention Hospital	Great Falls, Mont.	..	..	10	..	..	12	..	3	..	..	..	..	..	No	No	No	....
Essex County Hospital for Contagious Diseases	Belleville, N. J.....	..	..	30	..	..	..	..	10	..	..	..	..	..	Yes	Yes	Yes	....
Passaic Municipal Hospital	Passaic, N. J.....	..	..	4	..	..	3	..	..	..	..	..	..	..	No	No	No	....
Paterson City Hospital	Paterson, N. J.....	30	..	30	12	..	12	14	17	19	..	1	14	14	No	No	No	No
"Bergen Pines" Bergen County Hosp.	Ridgewood, N. J...	155	70	225	205	87	292	259	230	208	5	30	6	92	Yes	Yes	Yes	Yes
Trenton Municipal Hospital	Trenton, N. J.....	108	..	108	58	..	58	36	77	57	4	6	..	18	Yes	Yes	Yes	Yes
Kingston Avenue Hospital	Brooklyn.....	..	..	72	..	..	165	..	71	..	..	..	..	..	Yes	Yes	Yes	....
Riverside Hospital	New York City.....	284	..	284	679	..	679	677	338	339	7	75	..	197	Yes	Yes	Yes	Yes
Willard Parker Hospital	New York City.....	134	..	134	665	..	665	594	108	99	2	12	..	27	Yes	Yes	Yes	Yes
Municipal Hospital	Johnstown, Pa.....	..	..	12	..	..	4	..	..	..	..	..	..	..	No	No	Yes	....
Charles V. Chapin Hospital	Providence, R. I...	..	..	60	150	..	150	140	53	60	2	2	8	..	Yes	Yes	Yes	Yes
Firland Sanat. and Isolation Hospital	Richmond Highlands, Wash.....	200	50	250	63	20	83	132	223	212	1	52	3	76	Yes	Yes	Yes	Yes
Totals		2,131	137	2,556*	2,280	128	4,456*	3,952	2,306	2,134	45	459	75	876	15	14	18	14

* Partly unclassified.

Table 31.—General Hospitals Having Exceptional Facilities for Tuberculosis

Name	Location	Bed Capacity for Tuberculosis			Patients Admitted			Patients Discharged	Patients Present	Daily Average	Full-Time Staff				X-Ray Facilities	Fluoroscopic Facilities	Laboratory Facilities	Pneumothorax Facilities
		Adults	Children	Total	Adults	Children	Total				Graduate Nurses	Other Nurses	Other Employees					
Veterans Administration Facility	Tuskegee, Ala.	24	..	24	..	..	505	224	19	60	4	11	..	12	Yes	Yes	Yes	Yes
St. Mary's Hospital and Sanatorium	Tucson, Ariz.	..	..	50	..	..	229	189	35	40	..	..	..	..	Yes	Yes	Yes	Yes
Southern Methodist Hosp. and Sanat.	Tucson, Ariz.	..	..	30	..	..	....	....	..	..	..	6	..	27	Yes	Yes	Yes	Yes
Veterans Administration Facility	Tucson, Ariz.	275	..	275	627	..	627	629	342	312	11	44	1	203	Yes	Yes	Yes	Yes
Veterans Administration Facility	Whipple, Ariz.	300	..	300	..	..	....	....	..	..	12	36	..	231	Yes	Yes	Yes	Yes
Pulaski County Hospital	Little Rock, Ark.	22	..	22	..	..	32	30	14	15	..	2	1	2	....	....	....	....
Riverside County Hospital	Arlington, Calif.	83	8	91	86	11	97	87	84	75	2	8	1	16	Yes	Yes	Yes	Yes
Fort Bidwell Sanatorium	Fort Bidwell, Calif.	30	..	30	28	..	28	29	23	26	1	3	1	4	....	....	Yes	No
San Joaquin General Hospital	French Camp, Calif.	55	..	55	138	..	138	128	42	53	2	2	5	14	Yes	Yes	Yes	Yes
Fresno County General Hospital	Fresno, Calif.	84	8	92	..	..	155	151	94	90	3	6	6	10	Yes	Yes	Yes	Yes
Veterans Administration Facility	Livermore, Calif.	318	..	318	304	..	304	330	236	215	10	32	..	184	Yes	Yes	Yes	Yes
Los Angeles County Hospital	Los Angeles.	123	45	201*	..	..	1,216	1,163	252	..	3	25	25	..	Yes	Yes	Yes	Yes
Merced General Hospital	Merced, Calif.	26	24	50	25	42	67	49	34	..	1	3	1	4	No	No	....	No
Orange County Hospital	Orange, Calif.	79	13	92	84	50	134	102	92	85	1	3	8	11	Yes	Yes	Yes	Yes
Ross General Hospital	Ross, Calif.	..	..	18	51	..	51	43	18	14	..	..	3	6	Yes	Yes	Yes	Yes
San Bernardino County Charity Hosp.	San Bernardino, Calif.	45	18	63	66	18	84	91	48	46	1	3	7	16	Yes	Yes	Yes	Yes
San Diego County General Hospital	San Diego, Calif.	145	40	185	163	22	185	164	172	168	2	9	17	13	Yes	Yes	Yes	Yes
San Francisco Hospital	San Francisco.	355	60	415	766	..	766	775	380	380	..	29	37	..	Yes	Yes	Yes	Yes
U. S. Marine Hospital	San Francisco.	..	..	53	95	..	95	89	55	50	6	4	..	213	Yes	Yes	Yes	Yes
Fairmont Hospital of Alameda County	San Leandro, Calif.	153	..	153	413	..	413	411	150	150	2	7	19	19	Yes	Yes	Yes	Yes
Community Hospital of San Mateo County	San Mateo, Calif.	44	..	44	41	3	44	40	41	41	1	4	2	7	Yes	Yes	Yes	Yes
Santa Barbara General Hospital	Santa Barbara, Calif.	56	..	56	51	12	63	64	53	54	1	4	6	5	No	Yes	Yes	Yes
Santa Cruz County Hospital	Santa Cruz, Calif.	..	..	16	30	4	34	30	13	15	..	..	2	2	Yes	Yes	Yes	Yes
Ventura County Hospital	Ventura, Calif.	..	..	40	..	..	44	61	32	25	..	2	2	7	Yes	Yes	Yes	Yes
Veterans Administration Facility	West Los Angeles, Calif.	280	..	280	423	..	423	539	130	225	7	18	..	61	Yes	Yes	Yes	Yes
Gloekner Sanatorium and Hospital	Colorado Springs, Colo.	..	..	62	..	..	70	....	50	..	1	30	30	..	Yes	Yes	Yes	Yes
St. Francis Hospital and Sanatorium	Colorado Springs, Colo.	..	..	75	62	1	63	62	40	41	..	6	5	..	Yes	Yes	Yes	Yes
Union Printers' Home and Tuberculosis Sanatorium	Colorado Springs, Colo.	100	..	100	..	..	50	53	55	67	3	10	4	19	Yes	Yes	Yes	Yes
St. Joseph Hospital and Sanatorium	Del Norte, Colo.	..	..	10	6	..	6	2	8	..	..	1	..	..	No	....	Yes	Yes
Denver General Hospital	Denver.	80	..	80	178	..	178	183	64	64	..	..	..	..	Yes	Yes	Yes	Yes
Fitzsimons General Hospital	Denver.	536	..	536	..	..	915	903	447	462	46	95	163	623	Yes	Yes	Yes	Yes
Mennonite Hospital and Sanatorium	La Junta, Colo.	18	..	18	7	..	7	8	14	14	..	2	3	5	Yes	Yes	Yes	Yes
Wm. Wirt Winchester Hospital (Dept. of New Haven Hospital)	West Haven, Conn.	42	..	42	119	..	119	116	42	40	2	15	4	41	Yes	Yes	Yes	Yes
Gallinger Municipal Hospital	Washington, D. C.	80	20	100	283	38	321	290	82	63	1	4	6	10	Yes	Yes	Yes	Yes
Duval County Hospital	Jacksonville, Fla.	37	..	37	..	..	61	79	28	33	9	2	..	..	Yes	Yes	Yes	Yes
Pinellas County Home	Largo, Fla.	18	..	18	..	..	....	....	10	..	..	2	1	2	Yes	....	No	No
James M. Jackson Memorial Hospital	Miami, Fla.	32	..	32	62	..	62	61	33	28	2	4	..	..	Yes	Yes	Yes	Yes
Veterans Administration Facility	Boise, Idaho.	24	..	24	19	..	19	24	12	15	2	24	..	78	Yes	Yes	Yes	Yes
Cook County Hospital	Chicago.	327	..	327	1,240	..	1,240	1,242	335	328	5	38	..	..	Yes	Yes	Yes	Yes
Veterans Administration Facility	Hines, Ill.	250	..	250	491	..	491	476	250	250	5	19	..	27	Yes	Yes	Yes	Yes
Veterans Administration Facility	Alexandria, La.	157	..	157	330	..	330	328	91	95	15	37	..	258	Yes	Yes	Yes	Yes
Shreveport Charity Hospital	Shreveport, La.	..	..	50	..	..	183	183	50	50	..	3	..	..	Yes	Yes	Yes	Yes
Central Maine General Hospital	Lewiston, Me.	16	..	16	..	..	33	....	16	16	1	1	4	139	Yes	Yes	Yes	Yes
Fall River General Hospital	Fall River, Mass.	103	7	110	82	22	104	106	75	105	2	6	12	30	Yes	Yes	Yes	Yes
Burbank Hospital	Fitchburg, Mass.	36	..	36	32	..	32	39	19	27	..	2	..	..	Yes	Yes	Yes	Yes
State Infirmary	Tewksbury, Mass.	280	..	280	244	..	244	232	190	..	2	3	15	16	Yes	Yes	Yes	Yes
University Hospital	Ann Arbor, Mich.	..	..	98	528	12	540	442	98	92	7	30	6	9	Yes	Yes	Yes	Yes
Lincoln Hospital	Detroit.	..	..	80	169	..	169	177	23	67	4	12	..	10	Yes	Yes	Yes	Yes
Grand View Hospital	Ironwood, Mich.	60	..	60	36	..	36	36	44	47	1	4	1	..	Yes	Yes	Yes	Yes
St. Luke's Hospital	Duluth, Minn.	20	5	25	100	5	105	106	17	15	1	4	3	..	Yes	Yes	Yes	Yes
St. Mary's Hospital	Duluth, Minn.	..	..	28	89	9	98	98	16	16	1	2	4	..	Yes	Yes	Yes	Yes
Veterans Administration Facility	Fort Snelling, Minn.	194	..	194	250	..	250	244	168	175	12	15	..	47	Yes	Yes	Yes	Yes
Fairview Hospital	Minneapolis.	..	..	30	101	..	101	104	3	6	..	2	6	8	Yes	Yes	Yes	Yes
Ancker Hospital	St. Paul.	..	..	215	..	..	222	183	226	221	..	..	..	..	Yes	Yes	Yes	Yes
St. Louis City Hospital	St. Louis.	62	..	62	371	..	371	349	48	41	5	1	5	..	Yes	Yes	Yes	Yes
St. Louis City Hospital No. 2	St. Louis.	40	..	40	258	..	258	220	38	36	4	4	7	12	Yes	Yes	Yes	Yes
Douglas County Hospital	Omaha.	85	5	90	90	3	93	87	82	80	1	8	4	13	Yes	Yes	Yes	Yes
Winnebago Indian Hospital	Winnebago, Neb.	15	..	15	50	10	60	50	10	13	2	7	1	9	Yes	Yes	Yes	Yes
Medical Center of Jersey City	Jersey City, N. J.	75	..	75	393	2	395	377	86	79	2	11	4	23	Yes	Yes	Yes	Yes
St. Joseph Sanatorium and Hospital	Albuquerque, N. M.	..	..	96	..	..	84	68	49	34	..	..	..	..	Yes	Yes	Yes	No
Southwestern Presbyterian Sanatorium	Albuquerque, N. M.	..	..	80	..	..	125	102	55	47	..	7	2	20	Yes	Yes	Yes	Yes
Veterans Administration Facility	Albuquerque, N. M.	105	..	105	247	..	247	189	107	100	10	28	..	67	Yes	Yes	Yes	Yes
Veterans Administration Facility	Fort Bayard, N. M.	321	..	321	144	..	144	135	109	85	9	20	..	190	Yes	Yes	Yes	Yes
St. Anthony's Sanitarium and Hosp.	Las Vegas, N. M.	..	..	25	7	..	7	9	8	6	..	5	..	4	Yes	Yes	Yes	Yes
St. Vincent's Sanatorium and Hosp.	Santa Fe, N. M.	..	..	20	10	4	14	11	4	8	..	8	22	38	Yes	Yes	Yes	Yes
Albany Hospital	Albany, N. Y.	..	..	120	145	2	147	156	136	99	2	7	19	28	Yes	Yes	Yes	Yes
Kings County Hospital	Brooklyn.	200	..	200	1,457	..	1,457	1,346	198	168	3	18	24	30	Yes	Yes	Yes	Yes
Buffalo City Hospital	Buffalo.	272	52	324	457	27	484	486	311	317	3	22	27	..	Yes	Yes	Yes	Yes
Metropolitan Life Insurance Company Sanatorium	Mount McGregor, N. Y.	254	..	254	..	..	73	83	137	155	7	31	..	191	Yes	Yes	Yes	Yes
Bellevue Hospital	New York City.	174	..	174	3,394	..	3,394	3,353	204	217	8	31	10	..	Yes	Yes	Yes	Yes
Lenox Hill Hospital	New York City.	44	..	44	..	..	143	169	44	35	1	6	..	..	Yes	Yes	Yes	Yes
Metropolitan Hospital	New York City.	270	38	308	1,121	108	1,229	1,225	447	469	5	57	82	109	Yes	Yes	Yes	Yes
Montefiore Hospital for Chronic Diseases	New York City.	164	..	164	364	..	364	360	165	164	6	8	23	9	Yes	Yes	Yes	Yes
U. S. Marine Hospital	New York City.	130	..	130	48	..	48	52	135	131	4	57	..	201	Yes	Yes	Yes	Yes
Veterans Administration Facility	New York City.	62	..	62	..	..	....	....	59	55	7	88	..	419	Yes	Yes	Yes	Yes
Grasslands Hospital	Valhalla, N. Y.	253	80	333	325	131	456	427	316	300	9	54	26	102	Yes	Yes	Yes	Yes
Turtle Mountain Hospital	Belcourt, N. D.	14	..	14	..	..	49	39	7	10	1	6	1	6	No	No	Yes	No
City Hospital	Cleveland.	354	..	354	576	..	576	555	354	351	4	75	..	75	Yes	Yes	Yes	Yes
Veterans Administration Facility	Dayton, Ohio.	250	..	250	532	..	532	536	176	180	5	26	25	41	Yes	Yes	Yes	Yes
Veterans Administration Facility	Aspinwall, Pa.	181	..	181	370	..	370	311	177	175	16	47	..	250	Yes	Yes	Yes	Yes
Pittsburgh City Home and Hospitals	Mayview, Pa.	133	..	133	139	..	139	209	143	176	4	5	3	..	Yes	Yes	Yes	Yes
Jefferson Medical College Hospital	Philadelphia.	40	..	40	153	..	153	153	40	30	15	2	11	18	Yes	Yes	Yes	Yes
Philadelphia General Hospital	Philadelphia.	445	20	465	1,563	66	1,629	1,598	312	296	7	..	..	..	Yes	Yes	Yes	Yes
Berkeley County Hospital	Moncks Corner, S. C.	..	..	22	29	7	36	23	13	12	2	2	..	6	Yes	Yes	Yes	Yes
Spartanburg General Hospital	Spartanburg, S. C.	68	30	98	..	..	48	45	31	31	..	3	6	6	Yes	Yes	Yes	Yes
Veterans Administration Facility	Hot Springs, S. D.	90	..	90	103	..	103	96	46	43	3	17	..	36	Yes	Yes	Yes	Yes
Northwest Texas Hospital	Amarillo, Texas.	..	..	9	17	..	17	11	8	6	..	2	1	..	Yes	Yes	Yes	....
Wm. Beaumont General Hospital	El Paso, Texas.	46	..	46	..	..	26	....	8	..	17	32	..	36	Yes	Yes	Yes	Yes
Veterans Administration Facility	Legion, Texas.	..	..	433	..	..	397	....	244	..	13	32	..	220	Yes	Yes	Yes	Yes
Salt Lake General Hospital	Salt Lake City.	32	..	32	44	..	44	36	31	25	..	2	3	2	No	No	No	Yes
Tacoma Hospital	Tacoma, Wash.	40	228	268	27	276	303	262	227	249	3	16	..	58	Yes	Yes	Yes	Yes
Veterans Administration Facility	Walla Walla, Wash.	168	..	168	133	..	133	111	100	85	2	6	..	20	Yes	Yes	Yes	Yes
Veterans Administration Facility	Milwaukee.	254	..	254	197	..	197	193	134	143	1	21	..	34	Yes	Yes	Yes	Yes
Totals		9,551	701	11,942*	20,583	885	26,128*	24,627	9,664	8,927	373	1,406	717	4,662	86	86	80	86

* Partly unclassified.

Table 32.—Tuberculosis Departments of Hospitals According to Type of Service

State	General				Tuberculosis-Isolation				Nervous and Mental				Orthopedic				Hospital Departments of Institutions				Other			
	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted	Number of Institutions	Total Capacity	Capacity for Tuberculosis	Patients Admitted
Alabama	4	1,977	53	585	..	...	...	...	3	5,237	80	4	..	..	..	..	1	87	87	94	..	..	..	..
Arizona	15	1,687	695	1,177	..	...	...	...	..	.....	...	..	..	..	..	..	1	70	8	14	..	..	..	..
Arkansas	3	870	81	76	..	...	...	...	2	4,413	123	5	..	..	..	..	2	98	30	4	..	..	..	..
California	38	15,294	2,551	5,202	..	...	...	...	6	16,337	317	44	1	60	..	67	4	271	81	35	2	159	6	21
Colorado	13	2,861	909	1,359	..	...	...	...	2	3,819	34	4	..	..	..	..	2	105	5	7	..	..	..	..
Connecticut	3	922	48	249	2	211	56	113	2	5,943	136	..	..	..	..	..	..	..	..	..	..	..	..	..
Delaware	..	...	...	...	..	...	...	...	1	978	...	5	..	..	..	..	..	..	..	..	..	..	..	..
District of Columbia	5	2,645	150	720	..	...	...	...	1	5,275	146	30	..	..	..	..	..	..	..	..	1	182	..	25
Florida	9	1,151	118	282	..	...	...	...	1	4,125	48	..	2	65	..	14	2	62	32	16	..	..	..	..
Georgia	4	643	34	48	..	...	...	...	2	7,116	512	8	..	..	..	..	2	262	81	195	..	..	..	..
Idaho	6	638	72	89	..	...	...	...	..	.....	...	..	..	..	..	..	1	27	12	..	..	..	..	..
Illinois	19	8,198	710	2,062	..	...	...	...	11	31,904	934	149	3	505	225	215	3	149	33	84	..	..	..	..
Indiana	4	424	8	65	..	...	...	...	5	8,166	179	56	..	..	..	..	3	204	42	35	..	..	..	..
Iowa	4	1,375	50	230	..	...	...	...	7	10,283	145	23	..	..	..	..	2	73	12	10	..	..	..	..
Kansas	10	1,655	67	274	..	...	...	...	3	4,455	100	16	..	..	..	..	3	270	10	19	1	30	6	7
Kentucky	6	1,246	12	279	..	...	...	...	2	4,275	222	19	..	..	..	..	1	20	20	..	1	50	3	6
Louisiana	4	3,301	577	513	..	...	...	...	2	5,320	150	26	..	..	..	..	..	..	..	..	..	..	..	..
Maine	7	728	36	106	..	...	...	...	3	3,060	58	19	..	..	..	..	..	..	..	..	..	..	..	..
Maryland	1	278	20	39	..	...	...	...	6	7,491	163	58	2	200	..	..	2	92	17	11	..	..	..	..
Massachusetts	11	5,084	459	510	7	664	344	590	11	16,965	327	62	2	160	100	42	1	75	27	20	1	217	..	13
Michigan	11	3,614	383	1,193	3	1,561	861	1,487	9	15,658	224	28	..	..	..	..	1	232	90	413	1	133	58	58
Minnesota	10	3,323	564	940	..	...	...	...	6	9,221	262	167	1	250	..	26	2	80	19	6	1	50	..	2
Mississippi	1	28	4	6	..	...	...	...	2	3,400	241	..	..	..	..	..	..	..	..	..	..	..	..	..
Missouri	10	2,996	207	1,658	2	277	76	143	6	11,222	264	87	..	..	..	..	2	155	6	25	..	..	..	..
Montana	6	587	100	114	1	35	10	12	..	.....	...	..	..	..	..	..	..	..	..	..	..	..	..	..
Nebraska	7	1,055	141	225	..	...	...	...	..	.....	...	..	..	..	..	..	1	22	6	4	..	..	..	..
Nevada	4	251	18	24	..	...	...	...	..	.....	...	..	..	..	..	..	..	..	..	..	..	..	..	..
New Hampshire	2	278	...	16	..	...	...	...	1	1,950	20	..	..	..	..	..	..	..	..	..	..	..	..	..
New Jersey	8	2,128	133	604	5	1,469	397	365	4	9,199	338	63	1	375	..	87	2	95	12	14	..	..	..	..
New Mexico	14	1,428	667	790	..	...	...	...	..	.....	...	..	..	..	..	..	..	..	..	..	2	99	16	54
New York	36	18,584	2,031	9,112	3	1,166	490	1,509	26	65,180	1,712	577	4	612	60	112	4	444	201	135	3	801	186	409
North Carolina	4	171	7	17	..	...	...	...	2	4,194	110	3	1	150	50	..	1	115	6	2	1	50	..	7
North Dakota	5	267	21	94	..	...	...	...	2	2,784	45	3	..	..	..	..	1	35	10	3	..	..	..	..
Ohio	18	7,078	808	1,954	..	...	...	...	10	20,450	519	53	1	62	..	..	5	625	69	248	1	100	..	9
Oklahoma	10	1,201	88	398	..	...	...	...	3	6,140	100	40	..	..	..	..	1	50	..	21	..	..	..	..
Oregon	5	834	74	122	..	...	...	...	3	3,521	35	10	..	..	..	..	..	..	..	..	..	..	..	..
Pennsylvania	29	10,297	735	2,993	1	60	12	4	17	25,782	1,170	601	1	125	..	..	6	483	87	71	2	230	..	17
Rhode Island	3	1,381	...	38	1	265	60	150	1	2,301	...	..	..	..	..	..	1	24	..	3	..	..	..	..
South Carolina	5	747	136	202	..	...	...	...	1	3,454	...	..	..	..	..	..	..	..	..	..	..	..	..	..
South Dakota	4	342	105	242	..	...	...	...	..	.....	...	..	..	..	..	..	..	..	..	..	..	..	..	..
Tennessee	5	1,194	79	129	..	...	...	...	3	4,945	229	35	1	36	..	6	1	128	90	27	..	..	..	..
Texas	16	3,041	586	818	..	...	...	...	7	11,213	232	47	..	..	..	..	2	114	76	129	..	..	..	..
Utah	5	519	54	126	..	...	...	...	..	.....	...	..	..	..	..	..	..	..	..	..	..	..	..	..
Vermont	1	135	...	27	..	...	...	...	..	.....	...	..	..	..	..	..	..	..	..	..	..	..	..	..
Virginia	4	1,783	20	72	..	...	...	...	4	8,075	190	150	..	..	..	..	2	625	92	85	..	..	..	..
Washington	13	2,385	481	579	1	250	250	83	3	3,913	33	6	1	20	..	5	1	72	16	18	..	..	..	..
West Virginia	3	330	22	85	..	...	...	...	3	2,371	15	..	..	..	..	..	1	..	40	48	..	..	..	..
Wisconsin	11	4,196	337	655	..	...	...	...	8	5,637	50	25	..	..	..	..	1	20	5	4	..	..	..	..
Wyoming	2	75	17	26	..	...	...	...	2	985	15	2	..	..	..	..	..	..	..	..	..	..	..	..
Totals	418	121,225	14,468	37,124	26	5,958	2,556	4,456	193	366,757	9,478	2,425	21	2,620	435	574	65	5,184	1,322	1,800	17	2,101	275	628

mated that the daily census is 81,952. The accuracy of these figures is again demonstrated by the reports on the number of patients treated. With a daily census of 81,652 patients and 121,706 admissions, there should be approximately 203,358 patients treated during the year. Actually 166,818 were treated in institutions representing 82 per cent of the bed capacity, indicating a total of 203,436 for the entire group. Unfortunately, the number of readmissions and transfers is not known.

3. *Cost of Tuberculosis Hospitalization.*—The sanatoriums, tuberculosis departments and preventoriums represent a total replacement valuation of approximately $328,937,777.36, or a general average of $3,455.30 per bed. The sanatorium group averages $3,335 per bed, with the institutions of 100 beds or over averaging $3,498. In view of these figures it appears that it should be possible to keep the cost of sanatorium construction well below $6,000 or $7,000 per bed. To expend from $8,000 to $12,000 per bed, as some institutions have done, seems an unwarranted extravagance in the use of public and private funds. By limiting construction to essential needs, there will be more funds available for the actual care of patients.

The annual cost of tuberculosis hospitalization in the United States exceeds $70,000,000, a sum that emphasizes the magnitude of the tuberculosis problem as it still exists. The average cost of maintaining a tuberculous patient in the sanatoriums is $2.37 a day, in the tuberculosis departments $2.95, and in the preventoriums $1.39.

4. *Tuberculosis Hospitalization in General Hospitals.*—The tuberculosis departments of general hospitals, 418 in all, have a capacity of 14,601 beds. Many of them are regular sanatorium units, whereas others admit patients primarily for diagnosis and temporary care. As a whole, the group plays an important part in the control of tuberculosis for there were 37,079 tuberculous patients admitted in general hospitals during a one year period.

The practice of supplementing sanatorium facilities with tuberculosis departments in general hospitals has been indorsed by the American Medical Association, the American Hospital Association and the National Tuberculosis Association. The endorsement, however, embodies a requirement of adequate segregation for the protection of other patients and personnel. General hospitals continually admitting patients in need of segregation would benefit by the establishment of an isolation department not only for contagious diseases but also for tuberculosis, meningitis, encephalitis, pneumonia and other respiratory infections. By providing facilities of this type, general hospitals would be in position to offer complete community service.

5. *Preventorium Service.*—The prevention of tuberculosis among children has been a subject of much concern during recent years. Local agencies have worked diligently to provide for the care of undernourished children and tuberculous contacts, summer camps have been established as a general health measure, preventoriums have been built, and many sanatoriums have entered into the preventive phase of tuberculosis control. Thus, there are at present 230 sanatoriums which admit children including 161 where childhood tuberculosis, contacts and other nontuberculous children are accepted.

The sanatoriums reported on the condition of 12,629 children and showed that 6,659 had the childhood type, 824 were extrapulmonary cases, 3,236 were nontuberculous, and 701 were unclassified. The preventoriums in reporting on 2,479 patients showed that twelve were adult type tuberculosis, 424 childhood type, twenty-four extrapulmonary, 1,326 nontuberculous and 693 unclassified.

The preventorium service today is the culmination of a well organized antituberculosis program. In invading the sanatorium field it should not be permitted to interfere with the primary function of the sanatoriums, which is the hospitalization of tuberculous patients. The preventorium service defeats its own purpose when it allows the admission of tuberculous contacts and childhood tuberculosis to the exclusion of open pulmonary cases.

6. *Rehabilitation.*—Rehabilitation has not kept pace with the preventive and curative phases of the sanatorium service. Only fifty-three sanatoriums have made efforts to establish vocational rehabilitation as an aid to economic recovery. Two hundred and forty-one sanatoriums, however, have instituted programs of graduated exercise to insure a complete physical recovery and restore patients to a normal social life. In only five states is there an organized rehabilitation service under a bureau of vocational education. The problem, as a whole, is well worthy of further study. It is concerned with the cost of tuberculosis hospitalization and with the responsibility of individual institutions in the postsanatorium care of patients. Likewise, it involves the community's responsibility toward patients who remain physically handicapped and unable to compete on even terms in industry and other occupations.

7. *Medical Staff.*—The tuberculosis sanatoriums have a regular staff of 1,154 physicians and report an attending or consulting staff of 2,195. Twenty-six tuberculosis and isolation hospitals report a full-time staff of forty-five physicians, and ninety-three tuberculosis departments of general hospitals have 373 on full-time duty. The ratio of physicians to patients is 1 : 28 in the Veterans hospitals exclusively for tuberculosis, 1 : 52 in the Indian sanatoriums and 1 : 36 in the tuberculosis hospital operated by the U. S. Public Health Service. In the civilian sanatoriums the ratio is 1 : 62 in the state institutions, 1 : 51 in the county, 1 : 70 in the municipal, 1 : 60 in the city and county, and 1 : 32 in the private sanatoriums.

In fifty-two sanatoriums the medical staff participates in the training of medical students. Interns receive tuberculosis training in sixty-three sanatoriums and in 159 approved internship hospitals. Ninety-three sanatoriums and forty-four tuberculosis departments afford training for resident physicians, and sixty-seven sanatoriums offer postgraduate courses. Undoubtedly, many other sanatoriums are in position to establish centers of postgraduate training.

8. *Medical Facilities.*—It has been shown in the report that 406 sanatoriums have facilities for pneumothorax, 364 have equipment for minor surgery, 138 for major surgery and 152 for special chest surgery. Three hundred and thirty-three sanatoriums maintain surgical affiliations with other institutions. Dental departments are furnished in 273 sanatoriums, x-ray equipment in 350, fluoroscopic facilities in 363, and stereoscopic equipment in 316. One hundred and five refer part or all of their x-ray work to other hospitals. Three hundred and eighty-one sanatoriums have clinical laboratory facilities, but 375 refer part or all of their laboratory work to outside departments. Only 124 have facilities for necropsy work.

SUMMARY BY STATES

ALABAMA

In 1934 there were 2,942 cases of tuberculosis reported in Alabama, 1,611 deaths from pulmonary tuberculosis and 1,734 deaths from all forms. The tuberculosis death rate, which averaged 101.5 per hundred thousand during the period 1915 to 1924 and 83.6 from 1925 to 1934, decreased to 62.6 in 1934. At present the state department of public health has 9,257 cases of adult type tuberculosis on record.

Alabama has 462 beds for tuberculosis: 242 sanatorium beds, 53 in three general hospitals operated by the federal government, 80 in state mental hospitals, and 87 in a state penal institution. There are 426 beds for adults and 36 for children. During the annual period covered by this report there were 969 tuberculous patients admitted: 286 in the sanatoriums, 521 in the federal hospitals, 98 in state institutions and 64 in a private general hospital. At present there are 327 patients under treatment: 175 in the sanatoriums, 43 in the federal hospitals, 66 in the state mental institutions, and 42 in the state convict tuberculosis hospital.

There are four sanatoriums in the state, three county and one private. Two sanatoriums have x-ray facilities and three have laboratory equipment. All have facilities for artificial pneumothorax. There were 1,245 pneumothorax treatments given during a twelve months period. Only one sanatorium reports an outpatient department, but the state operates an efficient diagnostic service in the form of traveling clinics, which can examine more than 5,000 patients annually.

The tuberculosis institutions in Alabama have a replacement valuation of approximately $1,450,565.67. Their annual maintenance expenditure is $338,853.63. The sanatoriums are valued at $611,415.93 and expend annually about $112,858.63.

One new sanatorium has been opened since the survey was completed; namely, the Morgan County Sanatorium, Decatur, an institution of fifteen beds.

ARIZONA

Reports from the state board of health indicate that Arizona had 1,042 deaths from pulmonary tuberculosis in 1934 and 1,075 deaths from all forms. The tuberculosis death rate was 334 in 1923 and 237.3 in 1933. New cases of tuberculosis reported in 1934 total 1,178. The high mortality rate from tuberculosis is, of course, attributable to the fact that a large number of patients enter the state on account of the favorable climatic conditions.

Arizona has 1,518 beds for tuberculosis: 805 sanatorium beds, ten beds in a separate preventorium and 703 beds in tuberculosis departments of other hospitals. There are eighteen sanatoriums in the state, four Indian, two county, and twelve private.

The federal sanatoriums have 256 beds, the county sanatoriums 82, and the private sanatoriums 467. Eight of the sanatoriums have x-ray facilities, nine have fluoroscopic equipment, seven have clinical laboratories, and nine have facilities for pneumothorax. A total of 2,829 pneumothorax treatments was reported.

Sixteen general hospitals have a capacity of 703 beds for tuberculosis. These include two Veterans hospitals with 575 beds, three county institutions with 25 beds, and four private hospitals with 103 beds. Seven general hospitals of the Indian Administration, which did not specify the number of beds for tuberculosis, admitted 204 tuberculous patients and had 43 under treatment on the day of reporting.

During the twelve months period covered by this report there were 2,209 tuberculous patients admitted: 1,018 in the sanatoriums and 1,191 in the tuberculosis departments. The average daily census of patients was 788, and there were 1,004 patients present in all tuberculosis institutions on the day of reporting. The Veterans hospitals admitted 627 tuberculous patients, the sanatoriums and hospital departments of the Indian Administration admitted 696, the county sanatoriums and hospitals admitted 103, and the sanatoriums and tuberculosis departments under private control admitted 783.

Only one sanatorium has an outpatient department. Three tuberculosis clinics were reported, however, one in Phoenix, one in Tucson and one in Prescott.

The tuberculosis institutions in Arizona have a replacement valuation of approximately $5,716,949.59. Their annual maintenance expenditure is $1,357,390.45. The sanatoriums are valued at $2,306,331.90 and expend annually about $480,768.29.

One new sanatorium has been opened since the survey was completed; namely, the Welfare Sanatorium, Tempe, a federal institution of 110 beds.

ARKANSAS

The Arkansas State Board of Health reported 1,450 new cases of tuberculosis in 1933, 1,011 deaths from pulmonary tuberculosis and 1,071 deaths from all forms. The tuberculosis death rate at that time was 54 per hundred thousand.

Arkansas has 790 beds for tuberculosis, 556 sanatorium beds and 234 beds in tuberculosis departments of other hospitals. There are two sanatoriums in the state, one for white and one for Negro patients. These institutions operated by the state have 556 beds, including thirty-two in the Negro division.

Three federal hospitals have eighty-two beds for tuberculosis, the state hospital for mental diseases has 100, a state penal institution has eight and two county hospitals have forty-four.

The sanatoriums are staffed by full-time medical personnel. They have x-ray, fluoroscopic and laboratory equipment and have facilities for artificial pneumothorax. A total of 4,354 pneumothorax treatments was reported.

During the twelve months period covered by this report there were 834 patients admitted, 1,378 treated and 801 discharged. The average daily census of patients was 570, and there were 653 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 749 patients, and the tuberculosis departments 85.

The larger state sanatorium conducts an outpatient department. The state tuberculosis association and county health officers cooperate in school surveys and tuberculosis clinics throughout the state. Approximately 6,000 children were tuberculin tested in 1934. Regular tuberculosis clinics are maintained in Little Rock (Pulaski County). In the other counties there are diagnostic clinics occasionally.

The tuberculosis institutions in Arkansas have a replacement valuation of approximately $1,632,475.48. Their annual maintenance expenditure is $511,012.30. The sanatoriums are valued at $820,840.28 and expend annually about $270,635.80.

CALIFORNIA

Reports from the state board of health show that California had 4,115 deaths from pulmonary tuberculosis in 1934 and 4,609 deaths from all forms. The tuberculosis death rate was 74.8. New cases of tuberculosis reported in 1934 total 8,793.

California has 7,389 beds for tuberculosis: 4,016 sanatorium beds, 418 beds in separate preventoriums and 2,955 beds in tuberculosis departments of other hospitals. There are thirty-six sanatoriums in the state, one federal, ten county, one city and county, and twenty-four private. Additional tuberculosis facilities are available in thirty-eight general hospitals (2,551 beds), one orthopedic hospital, six mental institutions (317 beds), three penal institutions (sixty-five beds), one industrial hospital, one county institution (sixteen beds), and one convalescent hospital (six beds).

Federal hospitals have 1,102 beds for tuberculosis. These include four Veterans hospitals (884 beds), one army hospital (twenty beds), three naval hospitals (145 beds), a United States Marine Hospital (fifty-three beds), and three Indian hospitals, one of which reported thirty beds for tuberculosis.

The county sanatoriums have a capacity of 2,300 beds, and there are 1,268 beds for tuberculosis in twenty general hospitals under county control, and sixteen beds in the tuberculosis unit of a county home. One sanatorium under city and county control has eighty-two beds, and a general hospital under the same management has 415.

The bed capacity in twenty-four private sanatoriums is 1,390. Ten other private institutions, including seven general hospitals, have twenty-eight beds for tuberculosis.

Of the thirty-six sanatoriums, twenty-six have x-ray facilities, twenty-eight have fluoroscopic equipment, thirty have clinical laboratories and thirty-one have facilities for pneumothorax. A total of 31,226 pneumothorax treatments were reported.

During the twelve months period covered by this report there were 10,093 patients admitted, 13,702 treated and 8,010 discharged. The average daily census of patients was 5,518, and there were 6,037 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 3,948 patients, the tuberculosis departments 5,369, and the preventoriums 776. In 1934 the state subsidized 4,118 patients in twenty-eight county sanatoriums and hospitals.

Twelve sanatoriums report an outpatient department. This service is supplemented by tuberculosis clinics and school surveys conducted by county and city health units.

The tuberculosis institutions in California have a replacement valuation of approximately $18,586,626.03. Their annual maintenance expenditure is $5,978,423.44. The sanatoriums are valued at $10,061,468.87 and expend annually about $2,846,682.40.

COLORADO

Reports from the state tuberculosis association indicate that Colorado had 819 deaths from pulmonary tuberculosis in 1933 and 873 deaths from all forms. The tuberculosis death rate was 168.5 in 1923 and 83.0 in 1933. New cases of tuberculosis reported in 1934 total 846.

Colorado has 2,691 beds for tuberculosis: 1,743 sanatorium beds and 948 in tuberculosis departments of other hospitals. There are no public sanatoriums in the state of Colorado, but seventeen private sanatoriums are in operation, which vary in capacity from sixteen to 301 beds. Three federal hospitals admit tuberculous patients. These include one Indian hospital, the Veterans Administration Facility at Fort Lyon, recently converted into a mental hospital, and the Fitzsimons General Hospital, which has 536 beds for tuberculosis.

A state hospital for mental diseases has thirty-four tuberculosis beds and a state penal institution reports five. One county hospital reports seven beds for tuberculosis, and a general hospital under city and county control has eighty. Nine general hospitals, which are privately owned, have allocated 286 beds to the tuberculosis service.

Of the seventeen sanatoriums, eleven have x-ray facilities, twelve have fluoroscopic equipment, eleven have clinical laboratories, and fifteen have pneumothorax facilities. A total of 5,382 pneumothorax treatments was reported.

During the twelve months period covered by this report there were 2,507 patients admitted and 2,350 discharged. The average daily census of patients was 1,681, and there were 1,819 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 1,137 patients and the tuberculosis departments 1,370. The sanatoriums discharged 1,139 patients, including 132 deaths; they maintained a daily average of 1,033 and had 1,034 patients present on the day of reporting.

Four sanatoriums conduct outpatient departments. The city of Denver maintains a tuberculosis clinic, and there are other clinics throughout the state sponsored by the state tuberculosis association and local medical societies. Permanent tuberculosis clinics are also conducted by physicians in Colorado Springs and Pueblo.

The tuberculosis institutions in Colorado have a replacement valuation of approximately $10,632,096.32. Their annual maintenance expenditure is $2,566,029.89. The sanatoriums are valued at $7,527,837.84 and expend annually about $1,304,950.51.

One new sanatorium has been opened since the survey was completed; namely, the Black Forest Sanitarium, Colorado Springs, a federal institution of fifty beds.

CONNECTICUT

Reports from the state tuberculosis association indicate that Connecticut had 654 deaths from pulmonary tuberculosis in 1934 and 723 deaths from all forms. The tuberculosis death rate was 75.2 in 1925 and 42.6 in 1934. New cases of tuberculosis reported in 1934 total 1,312.

Connecticut has 1,915 beds for tuberculosis: 1,675 sanatorium beds and 240 beds in tuberculosis departments of other hospitals. There are seven sanatoriums in the state, five state institutions and two privately owned.

The state sanatoriums have 1,483 beds and the private sanatoriums have 192.

Other institutions that have tuberculosis departments include three general hospitals with forty-eight beds, two tuberculosis and isolation hospitals with fifty-six beds, and two mental institutions with 136 beds for tuberculosis.

During the twelve months period covered by this report there were 1,676 patients admitted, 3,082 treated and 1,521 discharged. The average daily census of patients was 1,571, and there were 1,674 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 1,314 patients and the tuberculosis departments 362.

All sanatoriums have x-ray, fluoroscopic and laboratory facilities, and six are equipped for pneumothorax. (One sanatorium admits extrapulmonary cases only.) A total of 14,686 pneumothorax treatments was reported.

The state sanatoriums conduct outpatient and diagnostic clinics under the auspices of the state tuberculosis commission. Districts are assigned to each institution, so that the entire state is covered. In five cities the tuberculosis clinics are operated by local agencies.

The tuberculosis institutions in Connecticut have a replacement valuation of approximately $5,511,717.67. Their annual maintenance expenditure is $1,835,263.55. The sanatoriums are valued at $4,550,808.16 and expend annually about $1,511,573.81.

DELAWARE

The Delaware State Board of Health reported 155 deaths from all forms of tuberculosis in 1934, at which time the tuberculosis death rate was 65 per hundred thousand. In that same year there were 178 new cases of tuberculosis reported.

Delaware has two state sanatoriums, one for white and one for Negro patients. Their capacity is 121 and forty beds, respectively; this includes forty-four beds for children. Tuberculous patients are also admitted in the state mental hospital, and there are twenty-two beds available in a private preventorium.

During the twelve months period covered by this report there were 149 patients admitted, 268 treated and 93 discharged. The average daily census of patients was 149, and there were 152 patients present on the day of reporting. The sanatoriums admitted 109 patients, and the state mental hospital five.

The state sanatoriums maintained a daily average of 129 and had a census of 139 patients when reporting. They discharged 93 patients and had 31 deaths. Both institutions are equipped for pneumothorax and reported 3,783 treatments.

The larger institution conducts an outpatient department, and there are tuberculosis clinics throughout the state conducted by the sanatorium staff and the state health department.

The tuberculosis institutions in Delaware have a replacement valuation of approximately $400,127.83. Their annual maintenance expenditure is $156,790. The sanatoriums are valued at $355,973.83 and expend annually about $147,000.

DISTRICT OF COLUMBIA

The District of Columbia has 666 beds for tuberculosis: 220 in the Tuberculosis Hospital, 150 in the Children's Tuberculosis Sanatorium, 100 in the Gallinger Municipal Hospital, 50 in three general hospitals under federal control, and 146 in a federal hospital for mental diseases.

These institutions and two private hospitals admitted 1,107 patients. Of this number, 417 were admitted to the federal hospitals which draw their patients from outside areas. The Gallinger Municipal Hospital admitted 321 tuberculous patients, the Tuberculosis Hospital admitted 210, and the Children's Sanatorium (recently opened) had received 122.

Reports from the District Board of Health and the local tuberculosis association indicate that there were 520 deaths from pulmonary tuberculosis in 1934 and 609 from all forms. In 1924 the tuberculosis death rate was 115.0 per hundred thousand. It increased to 123.0 in 1934. There were 1,138 new cases of tuberculosis reported in the District in 1934.

The sanatoriums and tuberculosis departments have a replacement valuation of approximately $2,647,606.13 and expend annually about $327,051.80. The sanatoriums are valued at $1,125,000. Plans are now in progress for a new tuberculosis sanatorium for adults.

A summer camp for children is maintained by the local tuberculosis association, which also cooperates with the health department in providing a tuberculosis clinic service for children.

FLORIDA

Florida has 330 beds for tuberculosis. There are three sanatoriums in the state, two county and one private, which have a capacity of eighty-six beds. Two private preventoriums have forty-six beds, and there are 198 beds in the tuberculosis departments of two federal hospitals, three state institutions, two county hospitals, a county home, three municipal hospitals and three private hospitals.

Recently a number of small county sanatoriums have opened with federal aid, and the Florida Tuberculosis Board has filed application for federal funds to construct five district tuberculosis hospitals.

Reports indicate that Florida had 959 deaths from pulmonary tuberculosis in 1933 and 1,039 deaths from all forms. The tuberculosis death rate, which was 87.2 in 1927, decreased to 66.9 in 1933. There were 661 new cases of tuberculosis reported in 1933 and 603 in 1934. During the annual period covered by this report, the sanatoriums admitted forty-eight patients, the tuberculosis departments 312, and the preventoriums 520.

GEORGIA

Georgia has 1,285 beds for tuberculosis: 645 sanatorium beds (153 for children), 13 beds in a separate preventorium, and 627 beds in tuberculosis departments of other hospitals. There are five sanatoriums, one state, one county, two city and county, and one private. Two mental institutions, one state and one federal, have 512 beds for tuberculosis; two penal institutions, one state and one federal, have eighty-one beds; and four general hospitals, three federal and one private, have thirty-four beds.

Reports from the state tuberculosis association show 3,647 new cases reported in 1934 and 1,736 deaths from all forms of tuberculosis. The tuberculosis death rate was 81.5 in 1920 and 57.7 in 1934.

There were 1,501 patients admitted: 1,222 in the sanatoriums, 251 in the tuberculosis departments, and 28 in the preventorium. The sanatoriums maintained a daily average of 553 patients and had 561 present on the day of reporting. They treated 1,458 patients, discharged 910 and had 109 deaths. A day's census in all tuberculosis institutions was 1,109.

Three sanatoriums maintain x-ray departments, four have laboratory equipment, and four have pneumothorax facilities. A total of 4,459 pneumothorax treatments was administered.

The state sanatorium maintains an outpatient department, and a field control survey has been established by the state department of public health. In 1934 there were 185 clinics held in 222 counties and 10,635 examinations made.

The sanatoriums are valued at $936,243.50 and expend annually about $325,277.65. All tuberculosis facilities in the state are valued at $3,337,820.26 and the annual maintenance expenditure in the sanatoriums and tuberculosis departments is approximately $972,448.16.

IDAHO

Idaho has one sanatorium, a 132 bed institution for Indian children. There are twenty-four tuberculosis beds in the Veterans Administration Facility at Boise and twelve beds in the Idaho State Soldiers Home Hospital. Three general hospitals have forty-eight beds for tuberculosis. The admission of tuberculous patients is also reported by two other general hospitals.

The state department of public welfare and the state tuberculosis association reported 109 deaths from pulmonary tuberculosis in 1934 and 130 deaths from all forms. The tuberculosis mortality rate was 46.4 in 1921, 36.5 in 1933, and 29.13 in 1934.

During the annual period under consideration there were 197 tuberculous patients admitted in the Indian sanatorium, nineteen in the Veterans Administration Facility, and seventy in private general hospitals. There were 171 tuberculous patients present in these institutions on the day of reporting.

ILLINOIS

Reports from the state board of health and the state tuberculosis association indicate that Illinois had 3,711 deaths from pulmonary tuberculosis in 1934 and 4,102 deaths from all forms. The tuberculosis death rate was 52 per hundred thousand in 1934. New cases of tuberculosis reported in 1934 total 9,743.

Illinois has 5,404 beds for tuberculosis: 3,478 sanatorium beds, 24 beds in a separate preventorium and 1,902 in tuberculosis departments of other hospitals. There are twenty-six sanatoriums in the state: sixteen county, two municipal, one city and county, and seven private.

The county sanatoriums have 1,486 beds, the municipal sanatoriums 1,299, the city and county sanatoriums 110, and the private sanatoriums 583.

Other institutions that have tuberculosis departments include nineteen general hospitals (710 beds), three orthopedic hospitals (225 beds), eleven mental institutions (934 beds), and three penal institutions (thirty-three beds).

During the twelve months period covered by this report there were 6,430 patients admitted, 9,281 treated and 5,833 discharged. The average daily census of patients was 3,600, and there were 4,935 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 3,920 patients and the tuberculosis departments 2,510.

Of the twenty-six sanatoriums, twenty-three have x-ray facilities, twenty-two have fluoroscopic equipment, twenty-four have laboratory departments, and twenty-four have facilities for pneumothorax. These institutions reported a total of 17,143 pneumothorax treatments. Sixteen sanatoriums have outpatient departments. The City of Chicago Municipal Tuberculosis Sanitarium, which also operates the Municipal Home for Open Cases, has recently established a pneumothorax clinic in the old Iroquois Memorial Hospital, Chicago. Tuberculosis clinics are carried out in the majority of counties by the sanatorium staffs.

The tuberculosis institutions in Illinois have a replacement valuation of approximately $18,616,110.27. Their annual maintenance expenditure is $4,894,161.49. The sanatoriums are valued at $10,126,690.59 and expend annually about $2,902,685.54.

INDIANA

Indiana has 1,586 beds for tuberculosis: 1,357 sanatorium beds and 229 in tuberculosis departments of other hospitals. There are nine sanatoriums in the state: one state and eight county.

The state sanatorium has 211 beds and the county sanatoriums have 1,146.

There are facilities for tuberculosis in four general hospitals, five mental institutions (179 beds) and three penal institutions (forty-two beds). The tuberculosis departments represent four federal hospitals, seven state institutions and one private hospital.

Reports from the state board of health and the state tuberculosis association indicate that Indiana had 1,552 deaths from pulmonary tuberculosis in 1934 and 1,788 deaths from all forms. The tuberculosis death rate was 54.2 in 1934. New cases of tuberculosis reported in 1934 total 1,723.

During the twelve months period covered by this report there were 1,698 patients admitted, 1,542 in the sanatoriums and 156 in the tuberculosis departments. The sanatoriums averaged 1,182 patients per day; they treated 2,763, discharged 1,553, and had 218 deaths. There were 1 401 patients present in all tuberculosis institutions on the day of reporting.

All the sanatoriums have equipment for x-ray and fluoroscopic examinations, and eight maintain laboratory departments. All are equipped for pneumothorax and reported a total of 7,741 treatments. Seven maintain outpatient departments. Tuberculosis clinics are carried out by the sanatorium staffs and the state department of health. Sixty-five clinics were reported in fifty-three counties. Home visits are made by public health nurses in seventy-seven counties.

The tuberculosis institutions in Indiana have a replacement valuation of approximately $5,432,341.42. Their annual maintenance expenditure is $1,011,911.77. The sanatoriums are valued at $4,558,862.83 and expend annually about $776,671.52.

IOWA

Reports from the state tuberculosis association indicate that Iowa had 520 deaths from pulmonary tuberculosis in 1934 and 619 deaths from all forms. The tuberculosis death rate was 24.9 in 1934. New cases of tuberculosis reported in 1934 total 455.

Iowa has 981 beds for tuberculosis: 774 sanatorium beds and 207 in tuberculosis departments of other hospitals. There are six sanatoriums in the state, one Indian, one state and four county.

The Indian sanatorium has eighty beds, the state sanatorium 363, and the county institutions 331.

There are tuberculosis departments in four general hospitals (fifty beds), seven mental institutions (145 beds) and two penal institutions (twelve beds). Two federal hospitals report seventy-seven beds, and five state institutions 130.

During the annual period covered by this report there were 881 patients admitted, 1,324 treated and 641 discharged. The average daily census of patients was 660, and there were 976 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 618 patients and the tuberculosis departments 263.

All the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax equipment. They administered a total of 5,075 pneumothorax treatments. One sanatorium reports an outpatient department. A tuberculosis clinic is conducted at the Broadlawns Polk County Public Hospital, and eighteen clinics were conducted by the tuberculosis association in 1934 in cooperation with county medical societies.

The tuberculosis institutions in Iowa have a replacement valuation of approximately $3,040,173.87. Their annual maintenance expenditure is $766 837.02. The sanatoriums are valued at $2,250,610.25 and expend annually about $554,196.27.

KANSAS

Kansas has 571 beds for tuberculosis: 388 sanatorium beds and 183 in tuberculosis departments of other hospitals. There are three sanatoriums: one state, one county, and one city and county.

The state sanatorium has 268 beds and the other sanatoriums have sixty beds each. Tuberculosis facilities are also available in four federal hospitals, four state institutions and nine private hospitals. This group contains ten general hospitals, three mental institutions, two penal institutions, one Indian school and one convalescent hospital.

Reports from the state department of health indicate that Kansas had 478 deaths from pulmonary tuberculosis in 1934 and 533 deaths from all forms. The tuberculosis death rate was 41.7 in 1924 and 27.9 in 1934. New cases of tuberculosis reported in 1934 total 902.

There were 742 patients admitted, 426 in the sanatoriums and 316 in the tuberculosis departments. The sanatoriums treated 754, discharged 401, and maintained an average daily census of 354. There were 542 patients present in all tuberculosis institutions on the day of reporting.

The state sanatorium maintains an outpatient department and conducts monthly tuberculosis clinics at Lawrence and in other localities with the cooperation of the state tuberculosis association.

The tuberculosis institutions in Kansas have a replacement valuation of approximately $1,765,936.23. Their annual maintenance expenditure is $451.204.63. The sanatoriums are valued at $1,067,916.22 and expend annually about $263,217.88.

KENTUCKY

The state of Kentucky has 1,206 beds for tuberculosis: 949 sanatorium beds and 257 in tuberculosis departments of other hospitals. There are four sanatoriums in the state: one federal, one state, one county, and one city and county.

The federal sanatorium has 375 beds, the state 80, the county 90, and the city and county 404. There are 112 beds for children. Seven general hospitals admit tuberculous patients, one county institution has twenty beds for tuberculosis, and two mental institutions have 222.

There were 2,092 deaths from pulmonary tuberculosis in 1933 and 2,315 deaths from all forms, according to a report from the state tuberculosis association. The tuberculosis death rate was 87.4 in 1933. New cases of tuberculosis reported in 1934 total 1,310.

During the twelve months period covered by this report there were 1,884 tuberculous patients admitted, 2,389 treated and 1,442 discharged. The average daily census of patients was 914, and there were 1,077 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 1,580 patients and the tuberculosis departments 304.

The sanatoriums are all equipped with x-ray, fluoroscopic, laboratory and pneumothorax facilities. They reported 10,487 pneumothorax treatments. Two maintain outpatient departments, and reports indicate that seventy-one county health departments are also conducting tuberculosis clinics. One hundred and sixty health nurses are available for home visits and clinic service.

The tuberculosis institutions in Kentucky have a replacement valuation of approximately $4,297,518.30. Their annual maintenance expenditure is $1,050,491.57. The sanatoriums are valued at $3,317,238.83 and expend annually about $786,488.32.

LOUISIANA

The Louisiana State Board of Health reported 1,398 deaths from pulmonary tuberculosis in 1934 and 1,513 deaths from all forms. The tuberculosis death rate was 113.4 in 1924 and 70.2 in 1934. New cases of tuberculosis reported in 1934 total 1,599.

Louisiana has 1,053 beds for tuberculosis: 326 sanatorium beds, and 727 in tuberculosis departments of other hospitals. There are three sanatoriums: one state and two private.

The state sanatorium has ninety-six beds and the private sanatoriums have 230.

Four general hospitals have 577 beds for tuberculosis, and two state mental institutions are hospitalizing at present 200 tuberculous patients. The state charity hospitals at New Orleans and Shreveport have a combined tuberculosis capacity of 371 beds, the United States Marine Hospital at New Orleans has 49 beds for tuberculosis, and the Veterans Administration Facility at Alexandria has 157 beds.

During the twelve months period covered by this report there were 836 patients admitted, 1,084 treated and 761 discharged. The average daily census of patients was 343, and there were 566 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 297 patients and the tuberculosis departments 539.

The tuberculosis institutions in Louisiana have a replacement valuation of approximately $3,413,143.61. Their annual maintenance expenditure is $844,565.82. The sanatoriums are valued at $820,851 and expend annually about $116,267.57.

The Gowen Sanatorium, Shreveport, a private institution of fifteen beds, has been opened since the survey was completed.

MAINE

The Department of Health and Welfare of the State of Maine reported 300 deaths from pulmonary tuberculosis in 1933 and 367 deaths from all forms. The tuberculosis death rate was 68.4 in 1924 and 45.5 in 1933. New cases of tuberculosis reported in 1934 total 640.

Maine has 576 beds for tuberculosis, including eighty-one for children. There are four sanatoriums in the state, with a capacity of 482 beds. The three state sanatoriums have 452 beds, and one private sanatorium has thirty.

Tuberculosis facilities are also available in three mental institutions and seven general hospitals, three federal and four private.

During the twelve months period covered by this report there were 616 patients admitted, 939 treated and 515 discharged. The average daily census of patients was 459, and there were 498 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 491 patients and the tuberculosis departments 125.

All the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax facilities. A total of 3,563 pneumothorax treatments was administered. Outpatient departments are maintained in three of the sanatoriums. Additional tuberculosis clinics and school surveys were inaugurated in January 1935.

The tuberculosis institutions in Maine have a replacement valuation of approximately $1,389.221.38. Their annual maintenance expenditure is $516,171.62. The sanatoriums are valued at $1,030,675.58 and expend annually about $419,610.12.

MARYLAND

The state department of health reported 1,233 deaths from pulmonary tuberculosis in 1934 and 1,384 deaths from all forms. The tuberculosis death rate was 121.8 in 1925 and 78.1 in 1934. New cases of tuberculosis reported in 1934 total 2,590.

Maryland has 1.550 beds for tuberculosis: 1,350 sanatorium beds and 200 in tuberculosis departments of other hospitals. There are eight sanatoriums: four state owned, one municipal and three private.

The state sanatoriums have 896 beds, the municipal 179, and the private sanatoriums 275.

Tuberculosis facilities are also available in a general hospital of the United States Public Health Service, a Veterans hospital for mental diseases, four state mental institutions, two penal institutions and three private hospitals.

During the twelve months period covered by this report there were 2,064 patients admitted: 1,956 in the sanatoriums and 108 in the tuberculosis departments. The sanatoriums treated 3,155 patients, discharged 1,857, and maintained an average daily census of 1,302. There were 1,537 patients present in all tuberculosis institutions on the day of reporting.

Seven of the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax facilities. None of the sanatoriums report an outpatient department, but many participate in the clinic service throughout the state. There were 458 clinics held in 1934, and 41,355 home visits were made by health nurses.

The tuberculosis institutions in Maryland have a replacement valuation of approximately $4,311,346.40. Their annual maintenance expenditure is $917,955.57. The sanatoriums are valued at $3,548,483 and expend annually about $712,505.57.

MASSACHUSETTS

Reports from the department of public health indicate that Massachusetts had 1,902 deaths from pulmonary tuberculosis in 1934 and 2,116 deaths from all forms. The tuberculosis death rate was 86.1 in 1924 and 48.7 in 1934. New cases of tuberculosis reported in 1934 total 3,585.

Massachusetts has 5,350 beds for tuberculosis: 4,063 sanatorium beds, 30 beds in a separate preventorium, and 1,257 beds in tuberculosis departments of other hospitals. There are twenty-three sanatoriums in the state: one federal, four state, seven county, four municipal and seven private.

The federal sanatorium has 472 beds; the state sanatoriums have 1,241, the county sanatoriums 1,176, the municipal sanatoriums 744, and the private sanatoriums 430. The sanatorium list does not include the tuberculosis division of the Fall River General Hospital or the tuberculosis departments of five "isolation and tuberculosis" hospitals, namely, the Board of Health Hospital, Brookline, the Lowell Tuberculosis Hospital, the Barnstable County Sanatorium, Pocasset, the Health Department Hospitals, Springfield, and Belmont Hospital, Worcester. These six hospitals have a total capacity of 845 beds. Their tuberculosis departments, which have a combined capacity of 418 beds, admitted 651 patients, treated 992, discharged 594, and maintained an average daily census of 359. They had 333 patients present on the day of reporting.

Twenty-seven other hospitals have facilities for tuberculosis, including ten state institutions for mental diseases (327 beds). There is one preventorium, a private institution of thirty beds.

During the twelve months period covered by this report there were 4,858 patients admitted, 8,323 treated and 4,342 discharged. The average daily census of patients was 3,992, and there were 4,679 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 3,426 patients, the tuberculosis departments 1,237, and the preventorium 195.

Of the twenty-three sanatoriums, eighteen have x-ray facilities, seventeen fluoroscopic equipment, nineteen laboratory departments and twenty-one pneumothorax facilities. These institutions administered 25,795 pneumothorax treatments. In addition, there were 4,437 pneumothorax treatments given in the six hospitals mentioned.

Thirteen sanatoriums report outpatient departments, and the state and county sanatoriums maintain fifteen diagnostic consultation clinics in their respective territories. In addition, all cities of 50,000 or over are required to provide diagnostic tuberculosis clinics.

Massachusetts has recently completed a noteworthy tuberculosis survey under the ten year "Chadwick plan" (1924-1934). More than 400,000 school children were tuberculin tested, 103,000 received a roentgen examination and 117,000 were given a physical examination. Arrangements have been made to continue the survey of school children.

The tuberculosis institutions in Massachusetts have a replacement valuation of approximately $19.099,201.56. Their annual maintenance expenditure is $5,296,884.85. The sanatoriums are valued at $14,640.324.81 and expend annually about $3,623,509.61.

MICHIGAN

Michigan had 1,909 deaths from pulmonary tuberculosis in 1934 and 2,199 deaths from all forms. The tuberculosis death rate was 66.7 in 1924 and 43.2 in 1934. New cases of tuberculosis reported in 1934 total 3,575.

There are 4,991 beds for tuberculosis: 3,355 sanatorium beds, 20 beds in a separate preventorium, and 1,616 beds in tuberculosis departments of other hospitals. The sanatoriums, twenty-three in all, include two state, eleven county, two municipal and eight private institutions.

The state sanatoriums have 866 beds, the county 809, the municipal 980 and the private 700. Eleven general hospitals report 383 beds for tuberculosis, nine mental institutions 224, one penal institution 90, an ear, nose and throat hospital 58, and three tuberculosis and isolation hospitals 861.

During the twelve months period covered by this report there were 5,914 patients admitted, 8,890 treated and 5,084 discharged. The average daily census of patients was 3,927, and there were 4,273 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 2,735 patients and the tuberculosis departments 3,179.

Nearly all the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax facilities, and thirteen reported an outpatient clinic service. The sanatoriums administered 38,629 pneumothorax treatments, and six tuberculosis departments gave 16,898.

The tuberculosis institutions in Michigan have a replacement valuation of approximately $18,065,158.94. Their annual maintenance expenditure is $3,508,299.47. The sanatoriums are valued at $10,742,513.77 and expend annually about $2,023,979.31.

MINNESOTA

Reports from the state department of health show that Minnesota had 796 deaths from pulmonary tuberculosis in 1934 and 921 deaths from all forms. The tuberculosis death rate was 69.49 in 1924 and 35.4 in 1934. New cases of tuberculosis reported in 1934 total 3,575.

Minnesota has 2,885 beds for the treatment of tuberculosis: 1,960 sanatorium beds, 80 beds in a separate preventorium, and 845 beds in tuberculosis departments of other hospitals. There are sixteen sanatoriums: one state, thirteen county and two private.

The state sanatorium has 390 beds; the county sanatoriums have 1.494 and the private sanatoriums seventy-six. There are 564 beds for tuberculosis in ten general hospitals, 262 in six mental hospitals and nineteen in two penal institutions. A county preventorium has eighty beds.

During the twelve months period covered by this report there were 2,626 patients admitted, 4,535 treated and 2,177 discharged. The average daily census of patients was 2,266, and there were 2,569 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 1,454 patients, the tuberculosis departments 1,141, and the preventorium 31.

All the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax facilities, except the private sanatorium for rehabilitation and two county sanatoriums that lack fluoroscopic equipment. The sanatoriums administered 14,152 pneumothorax treatments, and five other hospitals reported 3,184.

Nine sanatoriums report outpatient departments, but practically all carry on tuberculosis clinics and school surveys in their respective districts.

The tuberculosis facilities in Minnesota have a replacement valuation of approximately $10,507,788.58. The annual maintenance expenditure for tuberculosis is approximately $2,510.550.72. The sanatoriums are valued at $6,988,618 and expend annually about $1,435,865.05.

The United States Department of the Interior has recently constructed a new sanatorium for Indians as an annex to the Minnesota State Sanatorium.

MISSISSIPPI

Mississippi has 772 beds for tuberculosis: 527 sanatorium beds and 245 in tuberculosis departments of other hospitals. There are two sanatoriums, one state and one private, with 480 and 47 beds respectively.

A federal hospital for Indians has four beds for tuberculosis, and two state institutions for mental diseases have 241.

During the twelve months period covered by this report there were 401 tuberculous patients admitted, 718 treated and 373 discharged. The average daily census of patients was 340, and there were 586 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 395 patients and the tuberculosis departments six.

The tuberculosis facilities in Mississippi have a replacement valuation of approximately $3,014,507.67. The sanatoriums are valued at $2,080,000 and expend annually about $279,550.50.

MISSOURI

Reports from the state board of health and the state tuberculosis association show that Missouri had 2,248 deaths from tuberculosis in 1934 and a tuberculosis death rate of 61.56 per hundred thousand. New cases of tuberculosis reported in 1934 total 2,751.

Missouri has 2,050 beds for tuberculosis: 1,412 sanatorium beds, 85 beds in a separate preventorium and 553 beds in tuberculosis departments of other hospitals. There are seven sanatoriums: one state, two county, two municipal and two private.

The state sanatorium has 405 beds; the county sanatoriums have 118, the municipal 668 and the private 221. Tuberculosis facilities are available in two Veterans hospitals, a United States Marine Hospital and a mental hospital operated by the United States Department of Justice. Five mental institutions, four state and one municipal, have 264 beds for tuberculosis. two "tuberculosis and isolation" hospitals have 76, and other hospitals report 126. A preventorium under private management has eighty-five beds.

All but one sanatorium have x-ray, fluoroscopic and laboratory equipment. Six reported facilities for pneumothorax and a total of 12,984 treatments.

During the twelve months period covered by this report there were 3,461 patients admitted: 1,398 in the sanatoriums, 1,913 in the tuberculosis departments and 150 in the preventorium. The sanatoriums averaged 1,274 patients per day and there were 1,917 patients present in all tuberculosis institutions on the day of reporting.

The tuberculosis facilities in Missouri have a replacement valuation of approximately $6,055,189.58. The annual cost of tuberculosis hospitalization is approximately $1,379 664.51. The sanatoriums are valued at $3,775,277.28 and expend annually about $799,799.76.

MONTANA

Montana has one sanatorium, a state institution of 150 beds, including thirty for children. Four Indian hospitals have sixty beds for tuberculosis, a Veterans hospital has forty, and there are ten in a "tuberculosis and isolation" hospital operated under city and county control.

The sanatorium admitted 196 patients and the tuberculosis department 126. The federal hospitals admitted 109.

The state sanatorium has a full-time medical staff and is equipped for x-ray, fluoroscopic, laboratory and pneumothorax procedures. It reported a total of 1,050 pneumothorax treatments.

Provisional reports of the United States Census Bureau indicate that the 1933 tuberculosis mortality rate in Montana was 45.9 per hundred thousand from pulmonary tuberculosis and 52.5 from all forms.

The tuberculosis facilities in Montana have a replacement valuation of approximately $697,392.87. The state sanatorium is valued at $277,818 and expends annually about $98,070.30.

NEBRASKA

Reports from the state department of health indicate that Nebraska had 260 deaths from pulmonary tuberculosis in 1933 and 303 deaths from all forms. The tuberculosis death rate was 32.3 in 1923 and 21.7 in 1933.

Nebraska has 307 beds for tuberculosis: 160 sanatorium beds and 147 in tuberculosis departments of other hospitals. There is a state sanatorium, which has 127 beds for adults and thirty for children. A county hospital maintains a tuberculosis department of ninety beds, and there are facilities for tuberculosis in four general hospitals. Two federal hospitals have forty beds for tuberculosis, and six beds are available in a penal institution.

The sanatorium has a full-time medical staff and is equipped with x-ray, fluoroscopic, laboratory and pneumothorax facilities.

During the twelve months period covered by this report there were 388 patients admitted, 557 treated and 297 discharged. The average daily census of patients was 247, and there were 278 patients present in all tuberculosis institutions on the day of reporting. The sanatorium admitted 159 patients and the tuberculosis departments 229.

The tuberculosis facilities in Nebraska have a replacement valuation of approximately $960,201.31. The state sanatorium is valued at $400,000 and expends annually about $63,133.10.

NEVADA

The Nevada State Board of Health reports approximately 200 known cases of tuberculosis in the state. In 1934 there were seventy-five deaths from pulmonary tuberculosis and eighty-four from all forms. The tuberculosis death rate in 1933 was 94.6 per hundred thousand on the basis of United States Census reports.

Tuberculous patients are admitted in three general county hospitals, and in one hospital of the Indian Administration. Two of the county hospitals reported eighteen beds for tuberculosis, seven patients admitted, and all three had ten tuberculous patients under treatment at the time of reporting.

NEW HAMPSHIRE

New Hampshire has 230 beds for tuberculosis: 210 sanatorium beds and twenty in tuberculosis departments of other hospitals. There are two sanatoriums, one state and one private, with a capacity of 110 and 100 beds, respectively.

Tuberculous patients are also admitted in two general hospitals and one mental institution.

During the twelve months period covered by this report there were 153 patients admitted, 315 treated and 141 discharged. The average daily census of patients was 176, and there were 196 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 137 patients and the tuberculosis departments sixteen.

Provisional reports of the United States Census Bureau indicate that in 1933 the mortality rate from tuberculosis in New Hampshire was 38.0 per hundred thousand.

The tuberculosis institutions in New Hampshire have a replacement valuation of approximately $1,026,286.34. Their annual maintenance expenditure is $173,518.66. The sanatoriums are valued at $950,000 and expend annually about $152,973.66.

NEW JERSEY

Reports from the state board of health and the state tuberculosis association indicate that New Jersey had 2,038 deaths from pulmonary tuberculosis in 1934 and 2,230 deaths from all forms. The tuberculosis death rate was 90.14 in 1923 and 54.97 in 1933. New cases of tuberculosis reported in 1934 total 4,103.

New Jersey has 3,595 beds for tuberculosis: 2,468 sanatorium beds, 247 beds in a separate preventorium, and 880 in tuberculosis departments of other hospitals. There are sixteen sanatoriums: one state, nine county and six private.

The state sanatorium has 420 beds; the county sanatoriums have 1,817, and the private sanatoriums 231. In addition, there are 397 beds in five "tuberculosis and isolation" hospitals, 338 in four mental institutions, 133 in eight general hospitals, and twelve in two penal institutions. There is one preventorium aside from the sanatorium units for children.

During the twelve months period covered by this report there were 4,793 tuberculous patients admitted, 7,098 treated and 4,240 discharged. The average daily census of patients was 2,841, and there were 3,270 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 3,040 patients, the tuberculosis departments 1,133, and the preventorium 620.

Twelve sanatoriums have x-ray and fluoroscopic equipment, eleven have laboratory departments and thirteen have pneumothorax facilities. A total of 36,087 pneumothorax treatments was reported by the sanatoriums and 5,989 by other hospitals.

Tuberculosis clinics are maintained in all parts of the state under the supervision of the state and county sanatoriums, health departments and other agencies.

The tuberculosis institutions of New Jersey have a replacement valuation of approximately $18,512,088.77. Their annual maintenance expenditure is $3,111,003.17. The sanatoriums are valued at $14,880,509.60, and expend annually about $2,217,783.07.

NEW MEXICO

A report from the state bureau of public health indicates that New Mexico had 475 deaths from pulmonary tuberculosis in 1933 and 511 deaths from all forms. The tuberculosis death rate was 191.3 in 1929 and 122.6 in 1933. New cases of tuberculosis reported in 1933 total 670. These figures do not include Indians.

New Mexico has 1,553 beds for tuberculosis: 870 sanatorium beds and 683 in tuberculosis departments of other hospitals. There are eight sanatoriums in the state: one operated by the United States Public Health Service, two by the Indian Administration and five by private agencies. The federal sanatoriums have 430 beds and the private sanatoriums 440. Fourteen general hospitals have 667 beds for tuberculosis. These include two Veterans hospitals (426 beds), six Indian hospitals and six private institutions.

During the twelve months period covered by this report there were 1,508 patients admitted: 664 in the sanatoriums and 844 in the tuberculosis departments. The federal sanatoriums and departments admitted 533. The average daily census of patients was 857, and there were 958 patients present in all tuberculosis institutions on the day of reporting.

The tuberculosis facilities in New Mexico have a replacement valuation of approximately $4,700,828.26. The annual maintenance cost is approximately $1,219,158.98. The sanatoriums are valued at $2,116,589.21 and expend annually about $550,051.01.

NEW YORK

New York has 14,582 beds for tuberculosis: 9,650 sanatorium beds, 252 beds in separate preventoriums, and 4,680 in tuberculosis departments of other hospitals. There are sixty sanatoriums in the state: two federal, four state, twenty-eight county, five municipal, one city and county, and twenty private.

The federal sanatoriums have 999 beds, the state 300, the county 3,075, the municipal 2,509, the city and county 135, and the private 2,632. (Three new state sanatoriums were not in operation at the time of the survey.)

Other institutions that have tuberculosis departments include thirty-six general hospitals (2,031 beds), four orthopedic (sixty beds), three tuberculosis and isolation hospitals (490 beds), twenty-six mental institutions (1,712 beds), four penal institutions (201 beds), two chronic hospitals (164 beds), and one convalescent hospital (twenty-two beds).

These departments represent seven federal hospitals, twenty-eight state institutions, four county hospitals, one city and county hospital, fourteen municipal institutions and twenty-two private hospitals.

Reports from the state department of health and the New York City Health Department indicate that New York had 6,849 deaths from pulmonary tuberculosis in 1934 (3,950 in New York City) and 7,575 deaths from all forms (4,420 in New York City). The tuberculosis death rate in 1934 was 52.5 in upstate New York and 59.1 in New York City. New cases of tuberculosis reported in 1934 total 16,902 (10,722 in New York City).

During the twelve months period covered by this report there were 24,331 patients admitted, 32,960 treated and 20,639 discharged. The average daily census of patients was 11,850, and there were 13,249 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 11,631 patients, the tuberculosis departments 11,854, and four preventoriums 846.

Of the sixty sanatoriums fifty-one have x-ray equipment, fifty fluoroscopic facilities, forty-six laboratory departments, and fifty-two pneumothorax facilities. A total of 73,462 pneumothorax treatments was reported by the sanatoriums and 30,956 by other hospitals.

Twenty-seven sanatoriums maintain outpatient departments. There are sixty-nine permanent tuberculosis clinics in the state of New York according to the report of the state department of health. In addition, fourteen county tuberculosis hospitals conduct clinics in their respective districts, and the state department of health maintains an itinerant clinic service in twenty-six rural counties. The state department held 152 clinics in 1934 and made 6,177 examinations. In fifty-nine upstate clinics there were 44,477 examinations. In all, 84,343 examinations were made by the state department of health, the municipal and county tuberculosis hospitals, and local dispensaries. The Department of Health of New York City reported 54,601 patients treated in the tuberculosis clinics in 1934 and a total of 127,357 visits.

The tuberculosis institutions in New York have a replacement valuation of approximately $63,230,844.88. Their annual maintenance expenditure is $13,732,149.81. The sanatoriums are valued at $42,489,262.24 and expend annually about $8,494,022.07.

NORTH CAROLINA

North Carolina had 1,891 deaths from pulmonary tuberculosis in 1934 and 2,092 deaths from all forms. The tuberculosis death rate was 94.7 in 1924 and 63.4 in 1934. New cases of tuberculosis reported in 1934 total 2,136.

The total number of beds for tuberculosis is 2,625: 2,452 sanatorium beds and 173 in tuberculosis departments of other hospitals. There are twenty-three sanatoriums in the state: one federal, one state, seven county and fourteen private.

The federal sanatorium has 850 beds, the state sanatoriums 484, the county sanatoriums 486 and the private sanatoriums 632.

Tuberculosis facilities are available also in five general hospitals, two mental institutions (110 beds), one orthopedic hospital and a county home.

During the twelve months period covered by this report there were 2,865 patients admitted, 4,189 treated and 2,445 discharged. The average daily census of patients was 1,841, and there were 1,889 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 2,836 patients and the tuberculosis departments twenty-nine.

Of the twenty-three sanatoriums, eleven have x-ray facilities, twelve fluoroscopic equipment, eight laboratory departments, and thirteen pneumothorax facilities. Five sanatoriums maintain outpatient departments. The state sanatorium conducts a daily diagnostic clinic and examines approximately 3,000 patients annually. It was also reported that three physicians employed to conduct diagnostic clinics in various parts of the state examine annually about 3,000 adults and 25,000 school children.

The tuberculosis institutions in North Carolina have a replacement valuation of approximately $6,062,967.65. Their annual maintenance expenditure is $1,952,389.67. The sanatoriums are valued at $5,403,090.81 and expend annually about $1,774,675.42.

NORTH DAKOTA

A report from the state department of public health indicates that North Dakota had 133 deaths from pulmonary tuberculosis in 1933 and 167 deaths from all forms. The tuberculosis death rate was 41.78 in 1924 and 24.16 in 1933. New cases of tuberculosis reported in 1933 total 380.

North Dakota has 341 beds for tuberculosis: 265 sanatorium beds and seventy-six in tuberculosis departments of other hospitals. There is one sanatorium, a state-owned institution, which has 215 beds for adults and fifty for children. In addition, there are eighteen beds for tuberculosis in two Indian hospitals, forty-five in two state hospitals for mental diseases, and ten in a penal institution. Three private general hospitals accept tuberculous patients.

During the twelve months period covered by this report there were 300 patients admitted, 477 treated and 213 discharged. The average daily census of patients was 249, and there were 279 patients present in all tuberculosis institutions on the day of reporting. The sanatorium admitted 200 patients and the tuberculosis departments 100.

The tuberculosis facilities in North Dakota have a replacement valuation of approximately $887,487.65. The annual cost of tuberculosis hospitalization is approximately $234,031.34. The sanatorium is valued at $620,000 and expends annually about $163,041.84.

OHIO

Ohio has 4,670 beds for tuberculosis: 3,214 sanatorium beds, 60 beds in a separate preventorium and 1,396 in tuberculosis departments of other hospitals. There are twenty-one sanatoriums: one state, fourteen county, one municipal, one city and county, and four private.

The state sanatorium has 240 beds, the county sanatoriums 2,178, the municipal sanatoriums 48, the city and county sanatoriums 462, and the private sanatoriums 286.

There are additional tuberculosis facilities in three federal hospitals (273 beds), thirteen state institutions, a county home, three general city hospitals and fifteen private institutions.

Fourteen general hospitals reported 808 beds for tuberculosis and five state institutions for mental diseases reported 519 beds.

Of the twenty-one sanatoriums, twenty have x-ray departments, fluoroscopic equipment, clinical laboratories and pneumothorax facilities. The sanatoriums administered 30,496 pneumothorax treatments.

The Ohio State Department of Health reported 3,506 deaths from all forms of tuberculosis in 1934. The tuberculosis death rate was 76.14 in 1925 and 49.96 in 1934. New cases of tuberculosis reported in 1934 total 7,010.

During the twelve months period covered by this report there were 5,908 patients admitted, 7,861 treated and 4,183 discharged. The average daily census of patients was 3,509, and there were 4,198 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 3,444 patients, the tuberculosis departments 2,264, and one preventorium 200.

Twelve sanatoriums maintain outpatient departments. The state department of health reported ten diagnostic chest clinics in nine counties during 1933.

The tuberculosis institutions in Ohio have a replacement valuation of approximately $17,784,715.98. Their annual maintenance expenditure is $3,641,486.75. The sanatoriums are valued at $12,324,801.99 and expend annually about $2,269,524.75.

OKLAHOMA

Reports from the state department of public health and the state tuberculosis association indicate that Oklahoma had 1,219 deaths from pulmonary tuberculosis in 1933 and 1,255 deaths from all forms. The tuberculosis death rate was 49.2 in 1933. New cases of tuberculosis reported in 1933 total 861.

Oklahoma has 1,076 beds for tuberculosis: 888 sanatorium beds and 188 in tuberculosis departments of other hospitals. There are six sanatoriums in the state, two Indian, three state and one private. The federal sanatoriums have 225 beds, the state sanatoriums have 603, and the private sanatorium has sixty beds.

Tuberculosis facilities are also available in ten general hospitals, a state penal institution and three mental hospitals (100 beds).

Five sanatoriums have x-ray, fluoroscopic and laboratory facilities, and all have pneumothorax equipment. A total of 5,079 pneumothorax treatments were reported.

There were 1,677 patients admitted in one year, 2,258 treated and 1,141 discharged. The average daily census of patients was 769, and there were 922 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 1,218 patients and the tuberculosis departments 459.

Four sanatoriums maintain an outpatient department. The Oklahoma Tuberculosis and Health Association makes school surveys in cooperation with local agencies. In the past two and one-half years 70,000 tuberculin tests have been made.

The tuberculosis institutions in Oklahoma have a replacement valuation of aproximately $2,994.554.95. Their annual maintenance expenditure is $612,897.73. The sanatoriums are valued at $2,277,463.35 and expend annually about $419,774.73.

OREGON

Oregon has 622 beds for tuberculosis: 513 sanatorium beds and 109 in tuberculosis departments of other hospitals. There are four sanatoriums: two state, one county and one private.

The state sanatoriums have 409 beds, the county sanatorium has thirty-nine, and the private sanatorium has sixty-five. There are additional facilities for tuberculosis in five general hospitals and three mental institutions.

Reports from the state board of health and the state tuberculosis association indicate that Oregon had 289 deaths from pulmonary tuberculosis in 1934 and 349 deaths from all forms. The tuberculosis death rate was 65 in 1925 and 35.7 in 1933. New cases of tuberculosis reported in 1934 total 567.

During the twelve months period covered by this report there were 594 patients admitted, 827 treated and 385 discharged. The average daily census of patients was 468, and there were 610 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 462 patients and the tuberculosis departments 132.

Three of the sanatoriums have x-ray, fluoroscopic, laboratory and pneumothorax facilities. They administered 3,967 pneumothorax treatments during the year.

The two state sanatoriums maintain outpatient departments, and there are approximately eight tuberculosis clinics throughout the state. The University of Oregon Medical School conducts three tuberculosis clinics a week in Portland.

The tuberculosis institutions in Oregon have a replacement valuation of approximately $1,243,264.13. Their annual maintenance expenditure is $403,015.40. The sanatoriums are valued at $827,503.58, and expend annually about $291,045.15.

PENNSYLVANIA

The Pennsylvania Tuberculosis Society reported 4,517 deaths from pulmonary tuberculosis in 1934 and 4,965 deaths from all forms. The tuberculosis death rate was 86.6 in 1923 and 50.6 in 1934. New cases of tuberculosis reported in 1934 total 5,653.

Pennsylvania has 6,293 beds for tuberculosis: 4,189 sanatorium beds, 100 beds in a separate preventorium, and 2,004 beds in tuberculosis departments of other hospitals. There are seventeen sanatoriums: three state, three county, one municipal, one city and county, and nine private.

The state sanatoriums have 2,415 beds, the county sanatoriums have 337, the municipal sanatorium has 290, the city and county sanatorium has fifty-seven, and the private sanatoriums have 1,090 beds.

Tuberculous patients were also admitted in five federal hospitals, fifteen state institutions, six county institutions, three municipal hospitals, a city and county institution, and twenty-six private hospitals. Seventeen mental hospitals report 1,170 beds for tuberculosis and two penal institutions have twenty-two.

During the twelve months period covered by this report there were 9,133 patients admitted, 11,900 treated and 7,570 discharged. The average daily census of patients was 4,594, and there were 5,553 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 5,213 patients, the tuberculosis departments 3,686, and one preventorium 234.

Thirteen sanatoriums have x-ray equipment, fourteen have fluoroscopic apparatus, fifteen have laboratory departments, and sixteen have pneumothorax facilities. The sanatoriums reported 20,717 pneumothorax treatments and other hospitals reported 4,020.

Five of the sanatoriums report outpatient departments. There are 117 tuberculosis clinics in Pennsylvania. The state department of health conducts eighty-five, the Philadelphia City Department of Health eleven, the Pittsburgh City Department of Health three, the Tuberculosis League of Pittsburgh four, the Berks County Sanatorium one, the Delaware County Tuberculosis Society one and the Lancaster General Hospital one, and various hospitals and agencies in Philadelphia conduct eleven.

The tuberculosis institutions in Pennsylvania have a replacement valuation of approximately $25,749,730.59. Their annual maintenance expenditure is $4,111,546.33. The sanatoriums are valued at $17,338,585.93 and expend annually about $2,383,463.60.

RHODE ISLAND

Reports from the state board of health indicate that Rhode Island had 285 deaths from pulmonary tuberculosis in 1934 and 315 deaths from all forms. The tuberculosis death rate was 88.6 in 1924 and 43.6 in 1934. New cases of tuberculosis reported in 1934 total 1,014.

Rhode Island has 605 beds for tuberculosis: 495 sanatorium beds, sixty in tuberculosis departments of other hospitals, and fifty in a separate preventorium. There are two sanatoriums, one state and one private.

The state sanatorium has 430 beds and the private sanatorium sixty-five. Tuberculosis facilities are also available in one mental hospital, one penal institution, three general hospitals, and one isolation and tuberculosis hospital (sixty beds).

During the twelve months period covered by this report there were 854 patients admitted, 1,325 treated and 552 discharged. The average daily census of patients was 569, and there were 620 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 412 patients, the tuberculosis departments 191, and the preventorium 251.

The state sanatorium maintains an outpatient department, and there are tuberculosis clinics in every important center of population in the state.

The tuberculosis institutions in Rhode Island have a replacement valuation of approximately $1,150,350. Their annual maintenance expenditure is $376,335.87. The sanatoriums are valued at $900,000 and expend annually about $277,601.22.

SOUTH CAROLINA

South Carolina has 675 beds for tuberculosis: 539 sanatorium beds and 136 in tuberculosis departments of other hospitals. There are six sanatoriums: one state, three county, one city and county, and one private.

The state sanatorium has 277 beds, the county sanatoriums have 166, the city and county sanatorium has twenty-six, and the private sanatorium has seventy. Provisions are made for tuberculosis in a mental institution and in five general hospitals (136 beds).

The South Carolina Tuberculosis Association reported 1,080 deaths from pulmonary tuberculosis in 1933 and 1,094 deaths from all forms. The tuberculosis death rate was 91.0 in 1926 and 62.6 in 1933. New cases of tuberculosis reported in 1934 total 1,019.

During the twelve months period covered by this report there were 767 patients admitted, 969 treated and 505 discharged. The average daily census of patients was 507, and there were 530 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 565 patients and the tuberculosis departments 202.

Permanent tuberculosis clinics are maintained at the state sanatorium and in seven counties.

The tuberculosis facilities in South Carolina have a replacement valuation of approximately $923,812.31. The annual maintenance expenditure is approximately $285,868.96. The sanatoriums are valued at $684,704.81 and expend annually about $232,213.18.

SOUTH DAKOTA

South Dakota has 297 beds for tuberculosis: 192 in the state sanatorium and 105 in four general hospitals.

The state tuberculosis association reported 249 deaths from all forms of tuberculosis in 1934. The tuberculosis death rate was 40.42 in 1933 and 35.31 in 1934. New cases of tuberculosis reported in 1934 total 180.

During the twelve months period covered by this report there were 343 patients admitted and 540 treated. The average daily census of patients was 203, and there were 266 patients present in all tuberculosis institutions on the day of reporting. The sanatorium admitted 101 patients, and the tuberculosis departments 242.

The tuberculosis facilities in South Dakota have a replacement valuation of aproximately $1,150,503.29. The annual maintenance expenditure is approximately $241,854.95. The sanatorium is valued at $750,000 and expends annually about $133,993.70.

TENNESSEE

Tennessee has 1,572 beds for tuberculosis: 1,124 sanatorium beds, 398 in tuberculosis departments of other hospitals, and fifty in a separate preventorium. There are seven sanatoriums in the state: one county, two city and county, and four private.

The county sanatorium has 300 beds, the city and county sanatoriums have 503, and the private sanatoriums have 521.

Five general hospitals report seventy-nine beds for tuberculosis, three mental institutions 229 beds and one penal institution ninety beds.

A report from the state department of health indicates that Tennessee had 2,291 deaths from pulmonary tuberculosis in 1933 and 2,589 deaths from all forms. The tuberculosis death rate was 95.7 in 1933. New cases of tuberculosis reported in 1933 total 2,269.

During the twelve months period covered by this report there were 1,208 patients admitted, 1,943 treated and 995 discharged. The average daily census of patients was 891, and there were 1,209 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 979 patients, the tuberculosis departments 197, and the preventorium 32.

Four sanatoriums maintain outpatient departments, and the state department of health conducts periodic clinics in all counties having a full-time health service. Special tuberculosis studies have been made in three representative counties of the state. Approximately 50,000 persons were examined in the tuberculosis clinics from 1927 to 1934 inclusive.

Six sanatoriums have x-ray, fluoroscopic and laboratory facilities, and all have pneumothorax equipment. They reported a total of 5,335 pneumothorax treatments during a one-year period.

The tuberculosis institutions in Tennessee have a replacement valuation of approximately $3,803,098.17. Their annual maintenance expenditure is $889,385.97. The sanatoriums are valued at $2,245,000 and expend annually about $469,307.47.

TEXAS

A report from the state department of health indicates that Texas had 3,391 deaths from pulmonary tuberculosis in 1934 and 3,772 deaths from all forms. The tuberculosis death rate was 71.4 in 1933. New cases of tuberculosis reported in 1934 total 3,036.

Texas has 2,865 beds for the treatment of tuberculosis: 1,971 sanatorium beds and 894 in tuberculosis departments of other hospitals. There are seventeen sanatoriums: one state, two county, three city and county, and eleven private.

The state sanatorium has 718 beds, the county sanatoriums have 102, the city and county sanatoriums have 342, and the private sanatoriums have 809.

Fifteen general hospitals report 586 beds for tuberculosis, seven mental institutions 232 beds, one penal institution four beds, and one county home seventy-two beds.

During the twelve months period covered by this report there were 4,679 patients admitted: 3,685 in the sanatoriums and 994 in the tuberculosis departments. The sanatoriums treated 4,712 patients, discharged 3,389, and maintained an average daily census of 1,599. There were 2,341 patients present in all tuberculosis institutions on the day of reporting.

Two of the sanatoriums report outpatient departments. Ten have x-ray facilities, thirteen have fluoroscopic equipment, thirteen maintain laboratory departments, and sixteen have pneumothorax facilities. The sanatoriums reported 7,569 pneumothorax treatments during a twelve months period.

The tuberculosis institutions in Texas have a replacement valuation of approximately $8,049,766.70. Their annual maintenance expenditure is $1,810,081.19. The sanatoriums are valued at $4,636,829.75 and expend annually about $946,653.41.

UTAH

Reports from the state board of health and the state tuberculosis association indicate that Utah had eighty-six deaths from pulmonary tuberculosis in 1934 and ninety-three deaths from all forms. The tuberculosis death rate was 39.1 in 1920 and 18.3 in 1934. New cases of tuberculosis reported in 1934 total 141.

Utah has no sanatoriums but has fifty-four beds for tuberculosis in five general hospitals.

The tuberculosis departments admitted 126 patients during the twelve months period covered by this report. The average daily census of patients was twenty-five, and there were fifty patients present on the day of reporting.

The state department of health and the state tuberculosis association conduct tuberculosis clinics in various parts of the state.

VERMONT

A report from the state board of health shows that Vermont had 156 deaths from pulmonary tuberculosis in 1934 and 188 deaths from all forms. The tuberculosis death rate was 78 in 1924 and 52 in 1934. New cases of tuberculosis reported in 1934 total 113.

Vermont has 171 beds for tuberculosis: 127 in two state sanatoriums and forty-four in a separate preventorium.

During the twelve months period covered by this report there were 247 patients admitted, 368 treated and 210 discharged. The average daily census of patients was 157, and there were 161 patients present on the day of reporting. The sanatoriums admitted 137 patients and the preventorium eighty-three. A private general hospital admitted twenty-seven.

The tuberculosis institutions in Vermont have a replacement valuation of approximately $730,000. Their annual maintenance expenditure is $122,472.11. The sanatoriums are valued at $650,000 and expend annually about $94,137.20.

VIRGINIA

A report from the state board of health indicates that Virginia had 1,744 deaths from pulmonary tuberculosis in 1934 and 2,034 deaths from all forms in 1933. The tuberculosis death rate was 114.6 in 1925 and 83.3 in 1933. New cases of tuberculosis reported in 1934 total 3,886.

Virginia has 1,425 beds for tuberculosis: 1,123 sanatorium beds and 302 in tuberculosis departments of other hospitals. There are seven sanatoriums: three state, two municipal and two private.

The state sanatoriums have 760 beds, the municipal 278, and the private eighty-five. Tuberculosis facilities are also available in four general hospitals, four mental institutions, a city home, and one penal institution.

During a twelve months period there were 1,668 patients admitted: 1,361 in the sanatoriums and 307 in the tuberculosis departments. The sanatoriums treated 2,346, discharged 1,292, and maintained an average daily census of 985. There were 1,229 patients present in all tuberculosis institutions on the day of reporting.

In 1933 the state conducted tuberculosis clinics in eleven cities and eighty-seven counties. There were a total of 8,364 examinations and 1,664 x-ray studies.

The tuberculosis institutions in Virginia have a replacement valuation of approximately $3,734,627.10. Their annual maintenance expenditure is $855,274.18. The sanatoriums are valued at $2,773,047.85 and expend annually about $581,181.68.

WASHINGTON

Reports from the state board of health and the state tuberculosis association indicate that Washington had 744 deaths from pulmonary tuberculosis in 1933 and 857 deaths from all forms. The tuberculosis death rate was 76.7 in 1923 and 53.6 in 1933. New cases of tuberculosis reported in 1934 total 1,544.

The state of Washington has 1,531 beds for tuberculosis: 751 sanatorium beds and 780 in tuberculosis departments of other hospitals. There are nine sanatoriums in the state: one Indian, five county, and three private.

The federal sanatorium has forty beds, the county sanatoriums have 575 and the private sanatoriums have 136. In addition the Firland Sanatorium and Isolation Hospital has 250 beds, two Veterans hospitals have 174 beds for tuberculosis, two hospitals of the United States Public Health Service have 61, and an Indian hospital for general cases and tuberculosis has 268. There are twenty-seven beds for tuberculosis in a state hospital for mental diseases. Eight private hospitals reported the admission of tuberculous patients.

During a twelve months period there were 1,477 patients admitted, 2,316 treated and 1,235 discharged. The average daily census of patients was 1,183, and there were 1,284 patients present in all tuberculosis institutions on the day of reporting. The sanatoriums admitted 786 patients and the tuberculosis departments 691.

Four sanatoriums report outpatient departments, and there are tuberculosis clinics in various parts of the state conducted by the sanatorium staffs, tuberculosis association and local health authorities.

The tuberculosis institutions in Washington have a replacement valuation of approximately $4,034,445.65. Their annual maintenance expenditure is $1,145,685.14. The sanatoriums are valued at $1,776,027.23 and expend annually about $478,838.61.

One new sanatorium has been opened since the survey was completed; namely, the Blue Mountain Sanatorium, Walla Walla, a county institution of thirty-six beds.

WEST VIRGINIA

A report from the state department of health shows that West Virginia had 932 deaths from tuberculosis in 1933. The tuberculosis death rate was 77.7 in 1926 and 52.7 in 1933. There were 1,395 new cases of tuberculosis reported last year.

West Virginia has 849 beds for tuberculosis: 772 sanatorium beds and seventy-seven in tuberculosis departments of other hospitals. There are seven sanatoriums: three state, two county and two private.

The state sanatoriums have 648 beds, the county forty-nine and the private sanatoriums seventy-five. There are additional tuberculosis facilities in a general Veterans hospital, three state institutions for mental diseases, a state penal institution and two private general hospitals.

During a twelve months period there were 930 patients admitted: 797 in the sanatoriums and 133 in the tuberculosis departments. The sanatoriums treated 1,441 patients, discharged 766, and maintained an average daily census of 692. There were 802 patients present in all tuberculosis institutions on the day of reporting.

Two of the sanatoriums report outpatient departments, and there are additional tuberculosis clinics conducted by the state tuberculosis association.

The tuberculosis institutions in West Virginia have a replacement valuation of approximately $2,358,202.41. Their annual maintenance expenditure is $441,690.20. The sanatoriums are valued at $2,064,500 and expend annually about $362,591.95.

WISCONSIN

Reports from the state board of health and the state tuberculosis association indicate that Wisconsin had 1,006 deaths from pulmonary tuberculosis in 1934 and 1,117 deaths from all forms. The tuberculosis death rate was 66.5 in 1923 and 36.5 in 1934. New cases of tuberculosis reported in 1934 total 1,733.

Wisconsin has 2,497 beds for tuberculosis: 1,989 sanatorium beds, 392 in tuberculosis departments of other hospitals, and 116 in a separate preventorium. There are twenty-one sanatoriums: two state, seventeen county and two private.

The state sanatoriums have 282 beds, the county 1,610, and the private ninety-seven. A Veterans hospital has 254 beds for tuberculosis, and three

Indian hospitals have thirty-seven. Provisions have also been made for tuberculous patients in five state institutions, six county institutions and five private hospitals.

During the twelve months period covered by this report there were 2,730 patients admitted: 1,949 in the sanatoriums, 684 in the tuberculosis departments and ninety-seven in the preventorium. The sanatoriums treated 3,557, discharged 1,744, and maintained an average daily census of 1,843. There were 2,198 patients present in all tuberculosis institutions on the day of reporting.

Seventeen of the sanatoriums have x-ray, fluoroscopic and laboratory equipment, and twenty have pneumothorax facilities. A total of 11,991 pneumothorax treatments was administered during the year.

Seven of the sanatoriums report outpatient departments. In addition, there are tuberculosis clinics conducted by the Wisconsin Anti-Tuberculosis Association, local health departments, and county medical societies. In 1933 there were 275 clinics held in fifty-four communities.

The tuberculosis institutions in Wisconsin have a replacement valuation of approximately $8,237,947.56. Their annual maintenance expenditure is $1,923,595.94. The sanatoriums are valued at $6,509,923.30 and expend annually about $1,469,293.94.

WYOMING

Wyoming has sixty-five beds for tuberculosis: thirty-three in a state sanatorium and thirty-two in tuberculosis departments of other hospitals. A Veterans Administration Hospital for mental diseases has fifteen beds for tuberculosis, and a general Indian hospital has seventeen. Some provision has also been made for tuberculosis in the state hospital for mental diseases and in a private general hospital.

The sanatorium has a full time medical director. It is equipped for x-ray, fluoroscopic and laboratory examinations, and for pneumothorax therapy. The sanatorium maintains an outpatient department, and the medical director conducts tuberculosis clinics throughout the state in cooperation with the state tuberculosis association and local health agencies.

During the annual period covered by this report there were fifty-nine patients admitted for tuberculosis: thirty-one in the sanatorium and twenty-eight in the tuberculosis departments. The sanatorium treated forty-six patients and maintained a daily average of twenty-eight. The state board of health reported a tuberculosis death rate of 30.3 per hundred thousand in 1933.

The state sanatorium has a valuation of $200,588.93, and its maintenance expenditure is approximately $32,000 a year.

TUBERCULOSIS HOSPITALS AND SANATORIUMS, DEPARTMENTS AND PREVENTORIUMS

The following list contains the names and statistics concerning:

471 hospitals and sanatoriums. Page 1899.
740 tuberculosis department of hospitals. Page 1909.
29 institutions classified as preventoriums. Page 1915.

The statistics were obtained by inspection and by questionnaires returned during the year 1934 for the twelve months next preceding the date of questionnaire.

TUBERCULOSIS HOSPITALS AND SANATORIUMS

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians		Nurses		Total Employees*	Medical Facilities				Total Pneumothorax Treatments	Outpatient Department
	Adults	Children	Totalt	Adults	Children	Totalt						Regular Staff	Attending and Consulting	Graduate	Other		X-Ray	Fluoroscopic	Laboratory	Pneumothorax		
ALABAMA																						
County																						
Etowah County Tuberculosis Sanatorium, Alabama City	22	..	22	9	..	9	10	21	4	21	4	1	3	2	3	8	No	No	No	Yes	50	No
Jefferson Sanatorium, Birmingham	85	20	105	182	..	182	184	74	58	75	58	1	15	8	1	28	Yes	Yes	Yes	Yes	819	No
Mobile County Tuberculosis Sanitarium, Mobile	39	16	55	34	13	47	30	43	..	33	1	1	6	4	2	15	No	No	Yes	Yes	75	Yes
Private																						
Montgomery Tuberculosis Sanatorium, Montgomery	60	..	60	45	3	48	52	37	..	33	21	1	6	3	0	9	Yes	Yes	Yes	Yes	301	No
Totals	206	36	242	270	16	286	276	175	62	162	84	4	30	17	6	60	2	2	3	4	1,245	1
ARIZONA																						
Federal—U.S.I.A.																						
Fort Defiance Sanat., Fort Defiance	..	..	26	57	16	73	70	31	..	19	19	1	1	2	0	3	Yes	Yes	Yes	No	...	No
Phoenix Indian Sanatorium, Phoenix	150	...	150	..	..	291	207	146	..	97	..	1	0	8	0	31	Yes	Yes	Yes	Yes	415	No
San Xavier Indian Sanatorium, Tucson	35	..	35	28	5	33	6	33	..	34	0	1	0	3	1	14	Yes	Yes	Yes	Yes	82	Yes
Winslow Sanatorium, Winslow	30	15	45	24	71	95	60	35	5	14	5	1	2	4	1	16	Yes	Yes	Yes	Yes	...	No
County																						
Maricopa County Tuberculosis Hospital, Phoenix	37	..	37	..	..	..	..	37	..	37	..	1	3	0	2	5	No	No	No	No	...	No
Pima County Hospital, Tucson	45	..	45	70	2	72	60	42	..	43	15	1	0	4	0	9	No	No	No	No	...	No
Private																						
Helen Lee Sanatorium, Phoenix	..	..	9	13	..	13	7	13	..	6	2	0	5	1	1	4	No	No	No	No	60	No
Phoenix Sanatorium, Phoenix	80	..	80	..	..	35	..	4	..	20	..	1	2	1	0	2	Yes	Yes	Yes	Yes	...	No
St. Luke's Home, Phoenix	..	..	75	..	..	63	69	21	..	22	4	1	4	4	0	18	Yes	Yes	No	Yes	930	No
Pamsetgaaf Sanatorium, Prescott	..	..	30	40	..	40	40	10	..	10	2	3	1	0	1	13	Yes	Yes	Yes	Yes	200	No
Anson Rest Home, Tucson	..	..	30	25	..	25	15	19	..	16	5	1	4	3	2	10	No	No	No	No	...	No
Arizona State Elks Assn. Hosp., Tucson	35	..	35	33	..	33	26	10	..	15	7	1	2	3	1	7	No	No	No	No	4	No
Barfield Sanatorium, Tucson	..	..	22	..	..	22	..	18	..	12	..	1	6	2	0	10	No	No	No	Yes	...	No
Comstock Hospital, Tucson	..	30	30	..	49	49	29	20	6	20	0	1	0	2	0	6	....	....	....	....	...	...
Hillcrest Sanatorium, Tucson	..	..	23	..	..	50	..	11	..	..	..	0	0	2	0	0	No	No	No	No	...	No
Reardon Sanatorium, Tucson	..	..	16	31	..	31	25	9	..	10	2	1	0	3	0	8	No	No	No	No	50	No
St. Luke's in-the-Desert Sanat., Tucson	35	..	35	25	..	25	24	20	..	18	2	1	7	1	0	8	No	Yes	No	Yes	58	No
Southern Pacific Sanatorium, Tucson	..	..	82	68	..	68	63	46	..	43	11	3	4	5	0	30	Yes	Yes	Yes	Yes	1,030	No
Totals	447	45	805	414	143	1,018	701	525	11	436	74	20	41	48	9	194	8	9	7	9	2,829	1
ARKANSAS																						
State																						
McRae Memorial Sanat. (col.), Alexander	32	..	32	44	..	44	41	32	78	32	10	2	4	4	0	9	Yes	Yes	Yes	Yes	70	Yes
Arkansas Tuberculosis Sanatorium, State Sanatorium	436	88	524	550	155	705	730	532	93	523	31	6	0	6	48	200	Yes	Yes	Yes	Yes	4,284	No
Totals	468	88	556	594	155	749	771	564	171	555	41	8	4	10	48	209	2	2	2	2	4,354	1
CALIFORNIA																						
Federal—U.S.V.B.																						
Veterans Admin. Facility, San Fernando	244	..	344	325	..	325	328	240	..	214	40	9	1	24	0	171	Yes	Yes	Yes	Yes	441	Yes
County																						
Ahwahnee Tri-County Tuberculosis Sanatorium, Ahwahnee	82	26	108	70	35	105	92	108	3	99	5	2	0	11	0	36	Yes	Yes	Yes	Yes	...	No
Wish-i-ah Sanatorium, Auberry	32	34	66	46	48	94	91	68	3	72	2	1	0	5	5	28	Yes	Yes	Yes	Yes	342	Yes
Humboldt County School for the Tuberculous, Eureka	..	..	65	35	12	47	67	48	..	52	..	1	2	6	0	20	Yes	Yes	Yes	Yes	217	Yes
Stony Brook Retreat, Keene	100	..	100	109	..	109	107	90	10	97	22	2	0	4	2	31	Yes	Yes	Yes	Yes	644	No
Arroyo Sanatorium, Livermore	140	40	180	..	..	233	241	174	..	176	10	4	0	10	16	80	Yes	Yes	Yes	Yes	2,860	Yes

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

CALIFORNIA—Continued	Bed Capacity: Adults	Bed Capacity: Children	Bed Capacity: Total†	Patients Admitted: Adults	Patients Admitted: Children	Patients Admitted: Total†	Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians: Regular Staff	Physicians: Attending and Consulting	Nurses: Graduate	Nurses: Other	Total Employees*	Medical Facilities: X-Ray	Medical Facilities: Fluoroscopic	Medical Facilities: Laboratory	Medical Facilities: Pneumothorax	Total Pneumothorax Treatments	Outpatient Department
Bret Harte Sanatorium, Murphy	89	100	189	47	86	133	143	122	..	128	3	2	0	10	6	59	Yes	Yes	Yes	Yes	538	No
Olive View Sanatorium, Olive View	710	207	917	566	128	694	698	897	38	943	104	17	7	102	71	538	Yes	Yes	Yes	Yes	11,008	No
Santa Clara County Sanat., San Jose	..	..	96	73	18	91	96	94	65	95	8	3	0	9	7	29	No	Yes	Yes	Yes	2,681	Yes
Tulare Kings Counties Joint Tubercular Hospital, Springville	55	50	105	55	48	103	70	74	8	82	11	1	0	5	5	25	Yes	Yes	Yes	Yes	500	Yes
Weimar Joint Sanatorium, Weimer	428	46	474	362	35	397	395	463	..	454	126	6	9	10	18	130	Yes	Yes	Yes	Yes	1,929	Yes
City-County																						
Hassler Health Home, Redwood City	82	..	82	93	..	93	85	81	..	80	..	1	2	5	5	43	Yes	Yes	Yes	Yes	214	No
Private																						
Our Lady of Lourdes Sanat., Alta Loma	24	..	24	19	..	19	22	6	1	8	3	1	3	1	1	4	No	No	No	Yes	...	No
Banning Hospital and Sanat., Banning	..	..	25	20	..	20	7	13	..	..	3	1	0	4	0	8	Yes	Yes	Yes	Yes	42	...
Southern Sierras Sanat., Banning	..	..	35	28	1	29	21	18	..	11	2	1	4	2	0	11	Yes	Yes	Yes	Yes	288	No
California Sanatorium, Belmont	..	..	100	..	..	275	..	89	..	99	..	3	3	6	0	38	Yes	Yes	Yes	Yes	...	...
Silverado Sanatorium, Calistoga	50	..	50	50	2	52	52	36	..	34	20	2	2	3	2	10	Yes	Yes	Yes	Yes	118	No
Colfax School for the Tuberculous, Colfax	..	..	96	..	..	41	..	25	..	30	..	1	0	..	..	..	Yes	Yes	Yes	Yes	...	...
Los Angeles Sanatorium, Duarte	150	..	150	124	..	124	128	144	23	150	38	4	12	8	15	91	Yes	Yes	Yes	Yes	2,459	No
Hillcrest Sanatorium, La Crescenta	65	..	65	140	..	140	75	65	15	45	10	2	6	6	4	25	Yes	Yes	Yes	Yes	50	No
La Mesa Sanatorium, La Mesa	..	..	20	..	..	20	..	..	..	3	..	1	0	..	..	..	No	No	No	No	...	No
La Vina Sanatorium, La Vina	37	18	55	..	..	157	150	58	2	55	14	1	14	10	0	23	Yes	Yes	Yes	Yes	310	Yes
Barlow Sanatorium, Los Angeles	..	..	100	79	..	79	83	88	..	89	1	4	14	4	12	49	Yes	Yes	Yes	Yes	2,085	Yes
Belvedere Sanatorium, Los Angeles	..	..	33	..	..	..	..	21	..	..	..	0	0	1	..	..	No	No	No	No	...	No
Doughty Sanatorium, Los Angeles	..	..	12	23	..	23	22	7	..	8	..	0	6	1	1	2	No	No	No	No	...	No
Ex-Patients Home of the Jewish Consumptive Relief Assn., Los Angeles	60	..	60	78	..	78	57	63	..	54	2	2	12	0	4	..	No	Yes	Yes	Yes	1,105	Yes
Oak's Sanitarium, Los Gatos	..	..	60	52	..	52	40	36	..	37	8	2	0	4	0	16	Yes	Yes	Yes	Yes	600	...
Arequipa Sanatorium, Manor	44	..	44	59	..	59	73	41	..	36	2	1	6	4	0	10	Yes	Yes	Yes	Yes	425	...
Dore Sanatorium, Monrovia	..	..	19	..	..	..	..	15	..	..	..	0	3	2	..	..	No	No	No	No	...	No
Maryknoll Sanatorium, Monrovia	..	..	22	22	1	23	15	19	6	17	4	1	0	3	1	..	No	No	Yes	Yes	150	No
Norumbega Sanatorium, Monrovia	..	..	20	49	..	49	35	17	..	15	1	1	2	2	0	6	Yes	Yes	Yes	Yes	330	...
Pottenger Sanat. and Clinic, Monrovia	..	..	120	86	1	87	98	57	..	51	10	4	0	11	0	..	Yes	Yes	Yes	Yes	425	Yes
Independent Order of Foresters California Tuberculosis Sanatorium, Pacoima	..	..	120	..	..	..	..	33	..	60	..	1	2	..	..	..	No	No	No	No	...	No
Canyon Sanatorium, Redwood City	..	..	70	60	..	60	61	32	..	30	8	3	0	6	0	16	Yes	Yes	Yes	Yes	545	Yes
Alum Rock Sanatorium, San Jose	..	..	30	67	..	67	43	27	2	22	4	1	4	3	2	13	Yes	Yes	Yes	Yes	570	No
Sunland Sanatorium, Sunland	60	..	60	70	..	70	35	50	..	54	6	1	1	5	2	..	No	No	Yes	Yes	350	No
Totals	2,452	521	4,016	2,807	415	3,948	3,430	3,428	176	3,400	467	87	115	287	179	1,512	26	28	30	31	31,226	12
COLORADO																						
Private																						
Mesa Vista Sanatorium, Boulder	..	..	30	16	..	16	12	15	..	16	..	1	4	2	2	10	No	No	No	Yes	139	No
Cragmor Sanatorium, Colorado Springs	..	..	130	88	2	90	112	37	..	49	6	2	12	3	5	58	Yes	Yes	Yes	Yes	377	Yes
National Methodist Episcopal Sanat. for Tuberculosis, Colorado Springs	..	..	77	..	..	79	67	46	..	44	..	0	10	4	12	39	Yes	Yes	Yes	Yes	250	No
Sunnyrest Sanatorium, Colorado Springs	56	..	56	..	..	15	24	24	..	30	4	0	6	4	2	15	No	Yes	No	Yes	56	No
Bethesda Sanatorium, Denver	68	..	68	33	9	42	44	27	..	28	5	1	7	1	1	10	Yes	Yes	Yes	Yes	108	Yes
Costello Home, Denver	16	..	16	5	..	5	6	9	4	10	3	1	3	0	1	3	No	No	No	Yes	130	No
Ex-Patients Tubercular Home, Denver	72	..	72	24	..	24	13	48	9	45	1	1	12	2	2	15	Yes	Yes	Yes	Yes	104	No
National Jewish Hospital, Denver	190	62	252	151	67	218	216	244	48	241	29	7	64	6	26	170	Yes	Yes	Yes	Yes	1,968	Yes
Oakes Home Sanitarium, Denver	100	50	150	..	..	12	..	30	..	18	..	1	13	7	3	68	....	....	....	....	...	...
St. Francis Sanatorium, Denver	..	..	16	25	..	25	24	16	..	15	..	1	0	3	0	11	No	No	No	Yes	40	No
Sands House, Denver	47	..	47	30	..	30	24	34	..	37	7	1	15	1	3	9	Yes	Yes	Yes	Yes	240	No
Craig Colony, Edgewater	50	..	50	21	..	21	20	50	..	45	4	1	1	3	0	7	Yes	Yes	Yes	Yes	175	No
Swedish National Sanat., Englewood	..	..	78	..	..	95	84	61	..	63	16	1	27	4	6	31	Yes	Yes	Yes	Yes	405	No
Temple Sanatorium, Englewood	..	..	25	..	..	120	99	21	..	20	..	..	..	2	3	6	No	No	No	No	...	...
Sanatorium of the Jewish Consumptives' Relief Society, Spivak	301	..	301	131	..	131	147	205	66	184	25	6	43	4	18	110	Yes	Yes	Yes	Yes	586	Yes
Evangelical Lutheran Sanitarium, Wheat Ridge	125	..	125	27	..	27	45	55	..	60	13	2	1	6	2	26	Yes	Yes	Yes	Yes	254	No
Modern Woodmen of America Sanatorium, Woodmen	..	..	250	185	2	187	202	112	3	128	19	3	1	0	0	119	Yes	Yes	Yes	Yes	550	No
Totals	1,025	112	1,743	736	80	1,137	1,139	1,034	130	1,033	132	29	219	52	86	707	11	12	11	15	5,382	4
CONNECTICUT																						
State																						
Cedarcrest Sanatorium, Hartford	287	..	287	179	..	179	194	267	74	280	41	4	3	24	9	137	Yes	Yes	Yes	Yes	2,728	Yes
Undercliff, Meriden State Tuberculosis Sanatorium, Meriden	..	252	252	..	183	183	194	228	..	231	12	4	3	25	5	139	Yes	Yes	Yes	Yes	617	Yes
Norwich State Tuberculosis Sanatorium, Norwich	404	..	404	397	..	397	388	391	90	396	110	6	2	76	10	230	Yes	Yes	Yes	Yes	2,563	Yes
Laurel Heights State Tuberculosis Sanatorium, Shelton	350	..	350	231	..	231	233	350	..	343	63	5	0	75	6	202	Yes	Yes	Yes	Yes	3,076	Yes
The Seaside, Waterford	..	190	190	..	53	53	18	94	..	64	3	2	1	6	5	49	Yes	Yes	Yes	No	...	No
Private																						
Wildwood Sanatorium, Hartford	50	..	50	76	..	76	67	30	..	32	..	2	8	4	0	13	Yes	Yes	Yes	Yes	260	No
Gaylord Farm Sanatorium, Wallingford	142	..	142	..	..	195	195	140	..	141	4	5	0	6	10	..	Yes	Yes	Yes	Yes	5,442	...
Totals	1,233	442	1,675	883	236	1,314	1,289	1,500	164	1,487	233	28	17	216	45	770	7	7	7	6	14,686	4
DELAWARE																						
State																						
Brandywine Sanatorium, Marshallton	85	36	121	50	24	74	60	106	45	97	14	3	1	7	11	53	Yes	Yes	Yes	Yes	3,283	Yes
Edgewood Sanat. (col.), Marshallton	32	8	40	27	8	35	33	33	15	32	17	1	4	6	0	13	No	Yes	No	Yes	500	...
Totals	117	44	161	77	32	109	93	139	60	129	31	4	5	13	11	66	1	2	1	2	3,783	1
DISTRICT OF COLUMBIA																						
City																						
Children's Tuberculosis Sanatorium, Washington	...	150	150	..	122	122	6	134	..	69	..	4	51	11	0	41	Yes	Yes	Yes	Yes	...	No
Tuberculosis Hospital, Washington	220	..	220	210	..	210	203	221	30	216	84	6	52	20	0	66	Yes	Yes	Yes	Yes	2,300	No
Totals	220	150	370	210	122	332	209	355	30	285	84	10	103	31	0	107	2	2	2	2	2,300	0

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted								Physicians		Nurses			Medical Facilities					
	Adults	Children	Total†	Adults	Children	Total†	Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Regular Staff Attending and Consulting	Graduate	Other	Total Employees*	X-Ray	Fluoroscopic	Laboratory	Pneumothorax	Total Pneumothorax Treatments	Outpatient Department
FLORIDA																						
County																						
St. John's Tuberculosis Cottage, St. Augustine	..	..	10	..	..	..	...	5	..	..	..	1	1	0	1	1	No	No	No	No	...	No
Hillsboro County Tuberculosis Sanatorium, Tampa	66	..	66	48	..	48	36	63	22	60	9	1	0	2	3	16	No	No	No	...	50	No
Private																						
Tuberculosis Home for the Colored, West Palm Beach	..	..	10	..	..	..	...	5	..	..	..	0	2	1	0	2	No	No	No	No	...	No
Totals	66	..	86	48	..	48	36	73	22	60	9	2	3	3	4	19	0	0	0	0	50	0
GEORGIA																						
State																						
State Tuberculosis Sanatorium, Alto	224	113	337	701	255	956	674	293	545	280	43	4	1	20	27	157	Yes	Yes	Yes	Yes	3,724	Yes
County																						
Muscogee County Tuberculosis Sanatorium, Columbus	30	..	30	27	..	27	25	25	..	26	..	1	0	3	1	4	No	No	Yes	Yes	28	No
City-County																						
Battle Hill Sanatorium, Atlanta	178	40	218	..	..	167	146	206	200	211	61	3	0	1	25	48	Yes	Yes	Yes	Yes	473	No
Hopewell Sanatorium, Macon	..	..	24	..	..	45	40	21	7	20	5	1	0	0	3	..	No	No	No	....	84	...
Private																						
Fairhaven Tuberculosis Sanat., Athens	36	..	36	26	1	27	25	16	0	16	..	1	0	1	3	4	Yes	Yes	Yes	Yes	150	No
Totals	468	153	645	754	256	1,222	910	561	752	553	109	10	1	25	59	213	3	3	4	4	4,459	1
IDAHO																						
Federal—U.S.I.A.																						
Fort Lapwai Sanatorium, Lapwai	..	132	132	..	197	197	134	131	..	114	6	2	0	7	0	34	Yes	Yes	Yes	Yes	189	No
Totals	..	132	132	..	197	197	134	131	..	114	6	2	0	7	0	34	1	1	1	1	189	0
ILLINOIS																						
County																						
Kane County Spring Brook Sanatorium, Aurora	55	30	85	68	14	82	79	84	17	81	11	1	0	3	5	20	Yes	Yes	Yes	Yes	730	Yes
Elmgrove Sanatorium, Bushnell	36	..	36	32	..	32	27	31	..	28	8	1	1	3	1	12	No	No	Yes	Yes	143	...
Macon County Tuberculosis Sanatorium, Decatur	..	..	80	52	..	52	48	64	23	57	1	2	9	5	4	22	Yes	Yes	Yes	Yes	97	Yes
DeKalb County Tuberculosis Sanatorium, DeKalb	18	27	45	10	11	21	16	44	..	43	4	1	0	0	4	12	Yes	Yes	No	....	...	Yes
Madison County Tuberculosis Sanatorium, Edwardsville	70	20	90	114	18	132	146	76	65	79	19	1	0	4	4	45	Yes	Yes	Yes	Yes	787	Yes
Morgan County Tuberculosis Sanatorium, Jacksonville	..	..	40	35	6	41	42	25	..	22	10	1	0	2	3	13	Yes	Yes	Yes	Yes	125	Yes
Will County Tuberculosis Sanat., Joliet	80	20	100	43	7	50	57	83	..	76	14	1	2	2	8	30	No	No	Yes	Yes	...	No
Oak Knoll Sanatorium, Mackinaw	45	..	45	56	..	56	54	35	..	36	13	1	0	1	5	12	Yes	No	Yes	Yes	138	...
Woodford County Tuberculosis Sanatorium, Minonk	11	..	11	7	..	7	..	6	..	8	..	1	0	2	0	3	No	No	Yes	No	...	No
Fairview Sanatorium, Normal	50	..	50	12	..	12	20	20	29	24	3	1	0	4	2	10	Yes	Yes	Yes	Yes	390	Yes
Cook County Tuberculosis Hospital, Oak Forest	594	40	634	556	28	584	581	479	..	498	191	8	5	7	41	93	Yes	Yes	Yes	Yes	963	No
Highland, Ottawa	60	..	60	46	1	47	41	38	12	29	..	1	0	3	3	14	Yes	Yes	Yes	Yes	30	Yes
Livingston County Sanat., Pontiac	36	..	36	45	..	45	46	37	2	36	2	1	0	1	3	12	Yes	Yes	Yes	Yes	...	No
Hillcrest, Quincy	50	..	50	46	..	46	39	44	3	43	4	1	0	4	3	16	Yes	Yes	Yes	Yes	170	Yes
Rock Island County Tuberculosis Sanatorium, Rock Island	76	..	76	74	..	74	74	76	14	58	14	1	0	7	2	21	Yes	Yes	Yes	Yes	92	Yes
The Outlook, Urbana	..	..	48	29	..	29	23	36	6	35	5	1	0	1	7	20	Yes	Yes	No	Yes	...	No
City																						
City of Chicago Municipal Tuberculosis Sanitarium, Chicago	1,070	136	1,206	830	895	1,725	1,804	1,180	..	1,126	216	22	15	110	203	550	Yes	Yes	Yes	Yes	6,276	Yes
Peoria Municipal Tuberculosis Sanitarium, Peoria	70	23	93	77	39	116	114	93	17	92	12	2	8	14	1	36	Yes	Yes	Yes	Yes	2,461	Yes
City-County																						
Rockford Municipal Tuberculosis Sanatorium, Rockford	110	..	110	92	9	101	122	104	20	99	16	2	9	10	4	42	Yes	Yes	Yes	Yes	950	Yes
Private																						
Fox River Sanatorium, Batavia	50	..	50	..	..	49	38	48	6	45	3	1	5	5	0	15	Yes	Yes	Yes	Yes	750	Yes
Chicago Fresh Air Hospital, Chicago	100	..	100	86	1	87	85	25	..	21	21	2	0	5	1	20	Yes	Yes	Yes	Yes	525	No
Edward Sanatorium, Naperville	..	..	88	103	..	103	101	59	..	55	9	2	4	14	3	37	Yes	Yes	Yes	Yes	892	Yes
Ottawa Tuberculosis Sanat., Ottawa	..	..	115	137	7	144	138	84	..	84	15	2	5	11	2	33	Yes	Yes	Yes	Yes	628	No
Palmer Sanatorium, Springfield	60	..	60	95	4	99	86	36	..	37	4	2	4	2	7	23	Yes	Yes	Yes	Yes	196	No
Winfield Sanatorium, Winfield	88	32	120	95	31	126	122	79	..	89	6	1	4	2	5	28	Yes	Yes	Yes	Yes	600	Yes
Zace Sanatorium, Winfield	50	..	50	60	..	60	50	27	..	20	6	2	3	2	5	16	Yes	Yes	Yes	Yes	200	Yes
Totals	2,779	328	3,478	2,800	1,071	3,920	3,953	2,913	214	2,821	607	62	74	224	326	1,155	23	22	24	24	17,143	16
INDIANA																						
State																						
Indiana State Sanatorium, Rockville	117	94	211	103	86	189	182	206	150	200	4	4	0	16	0	92	Yes	Yes	Yes	Yes	971	Yes
County																						
Ella B. Kehrer Hospital, Anderson	40	15	55	..	..	65	85	43	..	32	20	1	0	2	3	18	Yes	Yes	No	Yes	100	Yes
Lake County Tuberculosis Sanatorium, Crown Point	188	17	205	149	22	171	172	203	34	202	41	3	0	17	8	74	Yes	Yes	Yes	Yes	1,331	Yes
Boehne Tuberculosis Hosp., Evansville	84	31	115	131	115	246	269	110	..	91	29	2	9	9	15	60	Yes	Yes	Yes	Yes	458	No
Irene Byron Tuberculosis Sanatorium, Fort Wayne	167	33	200	..	..	219	214	166	15	141	43	4	4	12	12	72	Yes	Yes	Yes	Yes	340	Yes
William Ross Sanatorium, LaFayette	45	..	45	56	..	56	56	35	2	38	9	1	5	4	3	16	Yes	Yes	Yes	Yes	1,225	Yes
Sunnyside Sanatorium, Oaklandon	199	62	261	180	79	259	250	261	61	261	21	4	42	22	8	84	Yes	Yes	Yes	Yes	2,184	Yes
Smith-Esteb Memorial Hosp., Richmond	50	..	50	21	1	22	6	19	9	15	1	1	11	2	2	11	Yes	Yes	Yes	Yes	8	No
Healthwin Hospital, South Bend	165	50	215	183	132	315	319	208	0	202	50	3	0	24	4	82	Yes	Yes	Yes	Yes	1,124	Yes
Totals	1,055	302	1,357	823	435	1,542	1,553	1,251	271	1,182	218	23	71	108	55	509	9	9	8	9	7,741	7

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians: Regular Staff	Physicians: Attending and Consulting	Nurses: Graduate	Nurses: Other	Total Employees*	Medical Facilities: X-Ray	Medical Facilities: Fluoroscopic	Medical Facilities: Laboratory	Medical Facilities: Pneumothorax	Total Pneumothorax Treatments	Outpatient Department
IOWA	Adults	Children	Total†	Adults	Children	Total†																
Federal—U.S.I.A.																						
Sac and Fox Tuberculosis Sanatorium, Toledo	..	80	80	..	..	48	56	75	..	81	..	1	1	5	0	24	Yes	Yes	Yes	Yes	...	No
State																						
State Sanat. for Tuberculosis, Oakdale	..	..	363	213	..	213	222	353	75	340	58	5	0	8	50	171	Yes	Yes	Yes	Yes	3,266	No
County																						
Pine Knoll Sanitarium, Davenport	80	26	106	..	..	113	110	82	..	60	15	1	0	7	0	26	Yes	Yes	Yes	Yes	...	...
Broadlawns Polk County Public Hospital, Tuberculosis Dept., Des Moines	100	..	100	68	..	68	75	56	..	52	21	4	2	4	6	41	Yes	Yes	Yes	Yes	538	No
Sunny Crest Sanatorium, Dubuque	70	..	70	90	..	90	91	68	..	66	13	1	0	4	4	18	Yes	Yes	Yes	Yes	1,120	...
Sunnyslope Sanatorium, Ottumwa	51	4	55	63	23	86	87	71	8	61	21	1	13	1	10	25	Yes	Yes	Yes	Yes	151	Yes
Totals	301	110	774	434	23	618	641	705	83	660	128	13	16	29	70	305	6	6	6	6	5,075	1
KANSAS																						
State																						
State Sanat. for Tuberculosis, Norton	236	32	268	163	36	199	191	264	88	264	26	5	8	8	28	141	Yes	Yes	Yes	Yes	3,380	Yes
County																						
Sedgwick County Tuberculosis Sanatorium, Wichita	60	..	60	..	..	67	52	41	..	48	19	1	0	4	3	15	No	No	No	Yes	75	No
City-County																						
Hillcrest Sanatorium, Topeka	50	10	60	73	87	160	158	43	6	42	15	2	6	4	5	20	Yes	Yes	No	Yes	125	No
Totals	346	42	388	236	123	426	401	348	94	354	60	8	14	16	36	176	2	2	1	3	3,580	1
KENTUCKY																						
Federal—U.S.V.B.																						
Veterans Admin. Facility, Outwood	375	..	375	796	..	796	727	281	15	270	39	9	0	38	0	265	Yes	Yes	Yes	Yes	267	Yes
State																						
State Tuberculosis Sanat., Louisville	80	..	80	146	..	146	98	74	1,725	51	7	3	5	12	3	37	Yes	Yes	Yes	Yes	2,039	No
County																						
Julius Marks Sanatorium, Lexington	68	22	90	116	..	116	111	93	3	91	12	2	11	3	7	39	Yes	Yes	Yes	Yes	971	No
City-County																						
Waverly Hills Sanat., Waverly Hills	314	90	404	434	88	522	506	500	45	502	116	8	1	21	61	230	Yes	Yes	Yes	Yes	7,210	Yes
Totals	837	112	949	1,492	88	1,580	1,442	948	1,788	914	174	22	17	74	71	571	4	4	4	4	10,487	2
LOUISIANA																						
State																						
Greenwell Springs Sanatorium, Greenwell Springs	96	..	96	85	6	91	79	89	79	88	16	1	0	3	11	38	Yes	No	No	Yes	36	No
Private																						
Orleans Tuberculosis Hosp., New Orleans	100	..	100	96	..	96	57	35	..	40	23	1	2	5	0	9	No	No	No	No	...	No
Pines Sanatorium, Shreveport	100	30	130	93	17	110	114	66	..	70	39	1	8	5	3	23	Yes	Yes	Yes	Yes	100	No
Totals	296	30	326	274	23	297	250	190	79	198	78	3	10	13	14	70	2	1	1	2	136	0
MAINE																						
State																						
Central Maine Sanatorium, Fairfield	184	..	184	..	..	205	215	168	..	173	50	3	1	19	8	90	Yes	Yes	Yes	Yes	1,256	Yes
Western Maine Sanatorium, Greenwood Mountain	111	39	150	109	42	151	164	129	10	144	24	3	3	13	4	84	Yes	Yes	Yes	Yes	957	Yes
Northern Maine Sanat., Presque Isle	76	42	118	111	..	111	107	113	11	112	9	2	1	11	5	47	Yes	Yes	Yes	Yes	1,095	No
Private																						
Bangor Sanatorium, Bangor	30	..	30	24	..	24	29	15	..	14	2	2	0	2	3	13	Yes	Yes	Yes	Yes	255	Yes
Totals	401	81	482	244	42	491	515	425	21	443	85	10	5	45	20	234	4	4	4	4	3,563	3
MARYLAND																						
State																						
Maryland Tuberculosis Sanatorium (col.), Henryton	126	30	156	..	..	212	200	157	60	156	77	2	0	5	16	60	Yes	Yes	Yes	Yes	...	No
Maryland Tuberculosis Sanatorium, Mt. Wilson	133	42	175	85	38	123	118	174	10	175	29	2	2	15	4	69	Yes	Yes	Yes	Yes	618	No
Maryland Tuberculosis Sanat., Salisbury	..	..	55	72	8	80	76	55	2	53	13	1	0	1	3	17	Yes	Yes	Yes	Yes	75	No
Maryland Tuberculosis Sanatorium, State Sanatorium	456	54	510	687	82	769	767	508	35	503	90	6	3	13	36	150	Yes	Yes	Yes	Yes	1,551	No
City																						
Baltimore City Hospitals (Tuberculosis Department), Baltimore	179	..	179	452	..	452	394	163	5	163	170	4	7	8	17	35	Yes	Yes	Yes	Yes	1,100	No
Private																						
Allegany County Tuberculosis Sanatorium, Cumberland	25	..	25	41	..	41	32	9	..	12	14	1	0	0	1	4	No	No	No	No	...	...
Mount Pleasant, Reisterstown	60	..	60	45	..	45	37	57	1	53	12	3	10	3	4	21	Yes	Yes	Yes	Yes	270	No
Hospital for Consumptives, Towson	142	48	190	..	..	234	233	193	26	187	27	4	6	14	18	88	Yes	Yes	Yes	Yes	1,225	No
Totals	1,121	174	1,350	1,382	128	1,956	1,857	1,316	139	1,302	432	23	28	59	99	444	7	7	7	7	4,839	0
MASSACHUSETTS																						
Federal—U.S.V.B.																						
Veterans Administration Facility, Rutland Heights	472	..	472	503	..	503	359	348	33	281	69	10	1	34	0	234	Yes	Yes	Yes	Yes	800	...
State																						
Lakeville State Sanat., Middleboro	106	198	304	127	75	202	216	282	..	283	28	6	6	18	53	177	Yes	Yes	Yes	Yes	...	Yes
North Reading State Sanatorium, North Wilmington	..	297	297	..	265	265	277	245	0	270	16	5	6	26	0	151	Yes	Yes	Yes	Yes	370	Yes
Rutland State Sanatorium, Rutland	370	..	370	357	..	357	365	360	0	342	62	8	3	17	50	201	Yes	Yes	Yes	Yes	4,839	Yes
Westfield State Sanatorium, Westfield	..	270	270	..	140	140	153	217	0	251	10	6	3	13	23	134	Yes	Yes	Yes	Yes	496	Yes
County																						
Bristol County Tuberculosis Hospital, Attleboro	50	10	60	82	6	88	87	65	0	65	19	2	5	5	9	56	Yes	Yes	Yes	Yes	178	Yes
Hampshire County Sanat., Haydenville	100	..	100	94	..	94	103	81	0	87	45	2	2	5	11	34	Yes	Yes	Yes	Yes	576	...
Essex Sanatorium, Middleton	360	..	360	300	..	300	307	336	0	342	97	6	11	33	51	175	Yes	Yes	No	Yes	3,275	Yes
Norfolk County Hosp., South Braintree	138	..	138	119	..	119	105	137	4	137	26	4	7	14	18	82	Yes	Yes	Yes	Yes	2,114	Yes
Plymouth County Hosp., South Hanson	114	16	136	..	..	103	89	114	..	112	25	4	1	8	20	74	Yes	Yes	Yes	Yes	1,473	Yes
Middlesex County Sanat., Waltham	252	..	252	169	..	169	174	252	83	258	36	9	6	13	29	156	Yes	Yes	Yes	Yes	4,614	Yes
Worcester County Sanat., Worcester	130	..	130	118	..	118	97	116	2	107	27	4	10	24	0	81	Yes	Yes	Yes	Yes	520	Yes

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians		Nurses		Total Employees*	Medical Facilities				Total Pneumothorax Treatments	Outpatient Department
	Adults	Children	Total†	Adults	Children	Total†						Regular Staff	Attending and Consulting	Graduate	Other		X-Ray	Fluoroscopic	Laboratory	Pneumothorax		
MASSACHUSETTS—Continued																						
City																						
Sanatorium Division of Boston City Hospital, Boston	616	..	616	533	..	533	479	595	20	584	205	7	8	65	15	338	Yes	Yes	Yes	Yes	3,886	No
Cambridge Sanatorium, Cambridge	85	..	85	..	..	116	121	84	..	85	30	1	1	4	10	36	No	No	Yes	Yes	300	Yes
Health Department Hospital, Chicopee	25	..	25	19	..	19	12	18	..	20	9	1	0	2	2	8	No	No	No	No	...	...
Holyoke Tuberculosis Sanat., Holyoke	18	..	18	..	..	28	40	36	..	35	11	1	1	4	0	13	No	No	Yes	No	...	No
Private																						
Channing Home, Boston	27	..	27	55	..	55	54	25	3	23	3	1	4	3	3	16	Yes	Yes	Yes	Yes	328	No
Sassaquin Sanatorium, New Bedford	94	24	118	70	9	79	82	106	3	112	24	3	22	8	9	51	Yes	Yes	Yes	Yes	1,315	Yes
Frederic S. Coolidge Memorial Home, Pittsfield	8	..	8	7	..	7	6	6	0	4	..	1	7	2	0	3	No	No	No	Yes	...	No
Pittsfield Anti-Tuberculosis Hospital, Pittsfield	14	..	14	14	..	14	15	9	1	10	4	1	11	2	0	5	No	No	No	Yes	85	No
Central New England Sanat., Rutland	100	..	100	..	..	27	27	39	0	40	1	1	3	4	0	26	Yes	Yes	Yes	Yes	152	Yes
Rutland Cottage Sanatoria, Rutland	..	..	113	51	..	51	50	19	0	15	2	2	14	4	2	14	Yes	No	Yes	Yes	324	No
Sharon Sanatorium, Sharon	30	20	50	28	11	39	44	35	0	34	..	1	1	4	3	29	Yes	Yes	Yes	Yes	150	No
Totals	3,109	835	4,063	2,646	506	3,426	3,262	3,525	149	3,497	749	86	133	312	308	2,094	18	17	19	21	25,795	13
MICHIGAN																						
State																						
American Legion Hosp., Battle Creek	375	..	375	166	..	166	182	165	0	162	51	3	5	21	0	120	Yes	Yes	Yes	Yes	2,337	No
Michigan State Sanatorium, Howell	406	85	491	161	30	191	222	463	113	480	27	8	4	42	9	198	Yes	Yes	Yes	Yes	9,301	Yes
County																						
Lenawee County Tuberculosis Sanatorium, Adrian	26	..	26	..	..	..	..	20	..	20	..	1	0	1	2	8	No	No	No	Yes	...	No
Calhoun County Public Hospital, Battle Creek	75	..	75	..	..	83	80	61	0	69	13	1	0	8	3	25	Yes	Yes	Yes	Yes	787	Yes
Copper Country Sanatorium, Houghton	53	..	53	27	..	27	27	53	25	52	9	1	2	5	2	18	Yes	Yes	Yes	Yes	...	Yes
Jackson County Sanatorium, Jackson	58	6	64	52	2	54	52	64	14	63	9	1	2	12	5	31	Yes	Yes	Yes	Yes	615	Yes
Ingham Sanatorium, Lansing	..	..	110	..	..	125	136	77	0	81	21	1	1	0	1	46	Yes	Yes	Yes	Yes	241	Yes
Morgan Heights Sanat., Marquette	53	37	90	67	64	131	102	81	4	72	24	2	5	11	3	40	Yes	Yes	Yes	Yes	780	Yes
Muskegon County Sanat., Muskegon	64	6	70	59	4	63	61	66	0	68	7	1	5	8	3	30	Yes	Yes	Yes	Yes	1,213	No
Bon Air Tuberculosis Sanat., Ontonagon	15	..	15	..	..	5	8	14	2	14	1	1	0	1	0	4	No	No	No	No	...	No
Oakland County Tuberculosis Sanatorium, Pontiac	120	60	180	202	76	278	256	139	0	157	29	3	1	23	0	68	Yes	Yes	Yes	Yes	2,606	Yes
Pinecrest Sanatorium, Powers	100	..	100	96	1	97	91	99	..	96	17	1	1	13	1	34	Yes	Yes	Yes	Yes	849	Yes
Saginaw County Tuberculosis Hospital, Saginaw	26	..	26	24	..	24	25	24	0	25	3	1	1	2	1	7	No	No	No	Yes	101	No
City																						
Sunshine Sanatorium, Grand Rapids	145	..	145	124	..	124	141	125	0	133	33	2	0	14	7	70	Yes	Yes	Yes	Yes	1,733	Yes
Wm. H. Maybury Sanat., Northville	675	160	835	477	187	664	664	815	0	808	42	14	5	90	30	398	Yes	Yes	Yes	Yes	11,073	No
Private																						
Bethesda Hospital (col.), Detroit	85	..	85	172	..	172	90	91	..	89	52	3	2	8	8	31	Yes	Yes	Yes	Yes	1,446	Yes
Detroit Tuberculosis Sanat., Detroit	120	30	150	117	..	117	118	135	..	133	23	3	10	1	18	43	Yes	Yes	Yes	Yes	845	Yes
Fairview Sanatorium (col.), Detroit	66	..	66	80	..	80	80	62	0	65	37	5	1	5	8	24	Yes	Yes	Yes	Yes	1,542	Yes
Good Samaritan Hosp. (col.), Detroit	29	..	29	78	..	78	71	23	0	21	38	2	5	4	2	12	Yes	Yes	Yes	Yes	256	No
Wehenkel Convalescent Home, Farmington	23	..	23	37	..	37	24	20	0	12	0	1	4	2	1	7	Yes	Yes	Yes	Yes	300	No
East Lawn Sanatorium, Northville	93	..	93	61	..	61	71	75	0	86	11	2	1	5	3	27	Yes	Yes	Yes	Yes	1,135	...
Pine Crest Sanatorium, Oshtemo	84	32	116	70	21	91	85	112	..	106	18	2	9	7	9	49	Yes	Yes	Yes	Yes	742	Yes
Leland Sanatorium, Ypsilanti	138	..	138	67	..	67	93	80	..	99	18	1	8	3	7	31	Yes	Yes	Yes	Yes	727	No
Totals	2,829	416	3,355	2,137	385	2,735	2,679	2,864	158	2,911	483	60	72	286	123	1,321	20	20	20	22	38,629	13
MINNESOTA																						
State																						
Minnesota State Sanat., Ah-Gwah-Ching	390	..	390	278	..	278	263	265	4	277	56	4	1	42	4	138	Yes	Yes	Yes	Yes	1,753	No
County																						
Otter Tail County Sanat., Battle Lake	44	..	44	..	..	26	28	38	0	33	7	1	0	4	2	13	Yes	Yes	Yes	Yes	200	...
Mineral Springs Sanat., Cannon Falls	100	..	100	..	..	59	60	92	0	88	14	2	0	12	1	31	Yes	Yes	Yes	Yes	443	No
Sunnyrest Sanatorium, Crookston	60	..	60	..	..	60	69	60	1	57	12	1	0	7	3	25	Yes	Yes	Yes	Yes	790	Yes
Deerwood Sanatorium, Deerwood	..	..	24	15	..	15	15	24	0	22	5	1	1	4	0	10	Yes	No	Yes	Yes	106	No
Riverside Sanatorium, Granite Falls	50	4	54	35	4	39	44	52	0	50	11	1	2	7	1	25	Yes	Yes	Yes	Yes	260	Yes
Sand Beach Sanatorium, Lake Park	46	..	46	..	..	30	25	40	0	44	5	1	0	5	1	17	Yes	Yes	Yes	Yes	105	Yes
Nopeming Sanatorium, Nopeming	210	25	235	200	34	234	235	220	29	226	28	3	18	21	18	136	Yes	Yes	Yes	Yes	1,304	Yes
Glen Lake Sanatorium, Oak Terrace	641	60	701	367	58	425	406	707	25	707	76	14	48	48	73	382	Yes	Yes	Yes	Yes	7,682	Yes
Lake Julia Tuberculosis Sanat., Puposky	..	..	53	67	..	67	60	60	0	53	10	1	1	3	5	21	Yes	No	Yes	Yes	300	No
Oakland Park Sanat., Thief River Falls	55	..	55	31	..	31	34	51	0	51	10	1	0	6	0	18	Yes	Yes	Yes	Yes	110	Yes
Buena Vista Sanatorium, Wabasha	30	..	30	20	..	20	20	30	0	28	4	1	1	1	3	13	Yes	Yes	Yes	Yes	452	Yes
Fair Oaks Lodge Sanatorium, Wadena	38	..	38	47	..	47	43	25	0	32	9	1	0	2	4	15	Yes	Yes	Yes	Yes	223	Yes
Southwestern Minnesota Sanatorium, Worthington	54	..	54	..	..	41	45	59	2	52	12	2	0	3	4	23	Yes	Yes	Yes	Yes	275	...
Private																						
Sarahurst, Minneapolis	20	..	20	..	..	29	13	..	..	13	..	0	1	0	0	3 (Rehabilitation service)						
Pokegama Sanatorium, Pokegama	56	..	56	53	..	53	56	22	0	22	9	1	5	2	7	25	Yes	Yes	Yes	Yes	149	Yes
Totals	1,794	89	1,960	1,113	96	1,454	1,416	1,745	61	1,755	268	35	78	167	126	895	15	13	15	15	14,152	9
MISSISSIPPI																						
State																						
Mississippi State Tuberculosis Sanatorium, Sanatorium	..	..	480	273	87	360	332	317	..	310	29	8	0	34	0	182	Yes	Yes	Yes	Yes	626	Yes
Private																						
Kings Daughters Tuberculosis Hospital, Meridian	47	..	47	35	..	35	41	28	0	30	14	1	0	2	1	7	No	No	No	No	...	No
Totals	47	..	527	308	87	395	373	345	..	340	43	9	0	36	1	189	1	1	1	1	623	1
MISSOURI																						
State																						
Missouri State Sanat., Mt. Vernon	356	49	405	431	35	466	434	388	88	335	53	4	4	9	39	180	Yes	Yes	Yes	Yes	6,044	Yes
County																						
Greene County Tuberculosis Sanatorium, Springfield	15	..	15	..	..	21	25	15	15	15	20	1	0	0	1	2	No	No	No	Yes	215	No
Jasper County Tuberculosis Hospital, Webb City	103	..	103	110	..	110	92	105	14	102	36	2	0	2	12	30	Yes	Yes	Yes	Yes	840	Yes

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians		Nurses		Total Employees*	Medical Facilities				Total Pneumothorax Treatments	Outpatient Department
	Adults	Children	Total†	Adults	Children	Total†						Regular Staff	Attending and Consulting	Graduate	Other		X-Ray	Fluoroscopic	Laboratory	Pneumothorax		
MISSOURI—Continued																						
City																						
Kansas City Tuberculosis Hospital, Kansas City	168	..	168	198	..	198	202	163	..	160	62	1	2	23	2	88	Yes	Yes	Yes	No	...	No
Robert Koch Hospital, St. Louis	464	36	500	336	..	336	324	499	..	493	92	8	16	18	58	213	Yes	Yes	Yes	Yes	4,300	No
Private																						
Jewish Sanatorium, Robertson	54	32	86	26	33	59	59	40	0	49	4	2	32	1	10	38	Yes	Yes	Yes	Yes	318	Yes
Mount St. Rose Sanatorium, St. Louis	135	..	135	..	..	208	189	130	16	120	56	2	4	11	8	92	Yes	Yes	Yes	Yes	1,267	...
Totals	1,295	117	1,412	1,101	68	1,398	1,325	1,340	133	1,274	323	20	58	64	130	643	6	6	6	6	12,984	3
MONTANA																						
State																						
Montana State Tuberculosis Sanitarium, Deer Lodge	120	30	150	159	37	196	202	136	56	137	36	3	0	9	5	52	Yes	Yes	Yes	Yes	1,050	No
Totals	120	30	150	159	37	196	202	136	56	137	36	3	0	9	5	52	1	1	1	1	1,050	0
NEBRASKA																						
State																						
Hospital for the Tuberculous, Kearney	127	33	160	159	..	159	160	157	25	154	21	3	2	3	12	58	Yes	Yes	Yes	Yes	385	Yes
Totals	127	33	160	159	..	159	160	157	25	154	21	3	2	3	12	58	1	1	1	1	385	1
NEW HAMPSHIRE																						
State																						
New Hampshire State Sanat. for the Treatment of Tuberculosis, Glencliff	110	..	110	51	..	51	64	93	3	90	7	2	1	5	4	40	Yes	Yes	Yes	Yes	868	No
Private																						
Pembroke Sanatorium, Pembroke	75	25	100	..	..	86	77	85	..	86	10	1	10	9	2	22	No	No	No	Yes	...	Yes
Totals	185	25	210	51	..	137	141	178	3	176	17	3	11	14	6	62	1	1	1	2	868	1
NEW JERSEY																						
State																						
New Jersey Sanatorium for Tuberculosis Diseases, Glen Gardner	300	120	420	383	139	522	558	406	37	441	18	8	4	21	54	198	Yes	Yes	Yes	Yes	13,000	Yes
County																						
Allenwood Sanatorium and Monmouth County Hospital for Tuberculosis, Allenwood	102	..	102	..	..	121	132	103	3	85	48	1	4	12	2	26	Yes	Yes	Yes	Yes	200	Yes
Lakeland Sanatorium, Grenloch	172	78	250	266	99	365	345	231	12	224	66	3	12	20	10	85	Yes	Yes	Yes	Yes	1,303	No
Shonghum Mountain Sanatorium, Morristown	52	..	52	40	2	42	43	51	8	52	15	1	0	5	4	24	Yes	Yes	Yes	Yes	514	No
Fairview Sanatorium, New Lisbon	121	..	121	..	..	134	137	102	0	109	49	2	0	12	0	38	Yes	Yes	Yes	Yes	779	No
Atlantic County Hospital for Tuberculous Diseases, Northfield	50	..	50	72	1	73	73	48	15	49	29	1	11	5	0	23	Yes	Yes	No	Yes	820	Yes
Valley View Sanatorium, Paterson	230	..	230	278	6	284	278	215	..	221	64	5	43	15	14	99	Yes	Yes	Yes	Yes	3,295	Yes
Bonnie Burn Sanat., Scotch Plains	251	140	391	251	342	593	605	365	0	360	93	5	9	11	32	165	Yes	Yes	Yes	Yes	5,617	Yes
Hudson County Tuberculosis Hospital and Sanatorium, Secaucus	207	..	207	..	..	243	169	209	..	207	116	4	6	21	0	131	Yes	Yes	Yes	Yes	5,015	Yes
Essex Mountain Sanatorium, Verona	414	..	414	432	..	432	434	407	39	412	188	6	58	36	0	246	Yes	Yes	Yes	Yes	4,835	No
Private																						
Browns Mills Nursing Cottage, Browns Mills	51	..	51	54	1	55	34	54	0	45	8	1	1	4	1	14	No	No	No	Yes	...	No
Deborah Sanatorium, Browns Mills	45	..	45	112	..	112	108	38	50	44	1	2	16	4	0	16	Yes	Yes	Yes	Yes	587	No
Mrs. Leonard's Manor Nursing Cottage, Browns Mills	..	..	27	..	..	20	....	..	..	23	..	1	..	..	..	..	No	No	No	No	...	...
Sycamore Hall Sanat., Browns Mills	18	..	18	..	..	...	....	..	..	..	..	2	0	2	1	8	No	No	No	No	...	...
The Pines Sanatorium, Chatsworth	..	..	30	..	..	..	....	2	..	..	..	1	1	..	..	8	No	No	No	No	...	No
Idylease Sanatorium, Newfoundland	60	..	60	..	..	44	38	31	0	31	10	2	1	2	2	10	Yes	Yes	Yes	Yes	122	No
Totals	2,073	338	2,468	2,022	590	3,040	2,954	2,262	164	2,303	705	45	166	170	120	1,091	12	12	11	13	36,087	6
NEW MEXICO																						
Federal—U.S.P.H.S.																						
U. S. Marine Hospital, Ft. Stanton	270	..	270	106	..	106	122	202	..	217	16	6	2	10	..	146	Yes	Yes	Yes	Yes	1,315	No
U.S.I.A.																						
Albuquerque Indian Sanatorium, Albuquerque	..	..	104	178	..	178	75	103	..	70	..	2	1	11	..	32	Yes	Yes	Yes	Yes	204	...
Jicarilla Sanatorium, Dulce	..	56	56	..	15	15	20	71	..	71	..	1	0	4	1	23	Yes	No	Yes	Yes	...	Yes
Private																						
Hillcrest Sanatorium, Albuquerque	..	..	85	..	..	115	...	62	..	62	..	0	7	4	2	20	Yes	Yes	No	No	...	No
Methodist Deaconess Sanat., Albuquerque	..	..	65	96	..	96	76	50	..	50	16	0	9	3	2	17	No	No	No	No	...	No
Holy Cross Sanatorium, Deming	160	..	160	56	..	56	76	45	..	53	11	1	3	8	3	52	Yes	Yes	Yes	Yes	260	No
Sunmount Sanatorium, Santa Fe	..	..	50	..	..	44	41	24	..	19	1	2	1	2	1	21	Yes	Yes	Yes	Yes	...	No
Valmora Sanatorium, Valmora	70	10	80	..	..	54	60	40	..	35	3	1	3	4	0	27	Yes	Yes	Yes	Yes	193	No
Totals	500	66	870	436	15	664	470	597	..	577	47	13	26	46	9	338	7	6	6	6	1,972	1
NEW YORK																						
Federal—U.S.V.B.																						
Veterans Admin. Facility, Castle Point	479	..	479	477	..	477	486	465	..	470	131	12	3	44	0	256	Yes	Yes	Yes	Yes	2,180	Yes
Veterans Admin. Facility, Sunmount	520	..	520	348	..	348	379	390	7	330	79	12	1	39	0	274	Yes	Yes	Yes	Yes	...	No
State																						
Herman M. Biggs Tuberculosis Sanatorium, Ithaca	(Not in operation at time of survey)																					
Tuberculosis Hospital, Mt. Morris	(Not in operation at time of survey)																					
New York State Tuberculosis Hospital, Oneonta	(Not in operation at time of survey)																					
New York State Hospital, Ray Brook	300	..	300	..	..	482	473	297	50	301	15	8	..	17	..	150	Yes	Yes	Yes	Yes	3,600	Yes
County																						
Montgomery Sanatorium, Amsterdam	60	12	72	88	15	103	114	73	..	76	18	2	9	7	3	25	Yes	Yes	Yes	Yes	484	Yes
Pleasant Valley Sanatorium, Bath	33	12	45	42	12	54	55	32	12	36	11	1	5	8	0	18	Yes	No	No	Yes	276	No
Newton Memorial Hospital, Cassadaga	120	60	180	103	35	138	133	171	1	169	21	3	3	14	3	79	Yes	Yes	Yes	Yes	2,354	Yes
Broome County Tuberculosis Hospital, Chenango Bridge	78	42	120	79	40	119	105	96	3	106	19	2	20	11	5	53	Yes	Yes	Yes	Yes	537	No

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

NEW YORK—Continued	Bed Capacity: Adults	Bed Capacity: Children	Bed Capacity: Total†	Patients Admitted: Adults	Patients Admitted: Children	Patients Admitted: Total†	Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians: Regular Staff	Physicians: Attending and Consulting	Nurses: Graduate	Nurses: Other	Total Employees*	Medical Facilities: X-Ray	Medical Facilities: Fluoroscopic	Medical Facilities: Laboratory	Medical Facilities: Pneumothorax	Total Pneumothorax Treatments	Outpatient Department
Delaware County Tuberculosis Sanatorium, Delhi	28	4	32	31	6	37	36	24	..	28	8	1	6	4	3	14	Yes	Yes	Yes	Yes	164	Yes
Chemung County Sanatorium, Elmira	36	..	36	..	..	59	72	35	1	31	17	1	..	4	1	11	Yes	Yes	Yes	Yes	345	Yes
Nassau County Sanat., Farmingdale	285	101	386	389	466	855	808	357	3	341	71	6	7	34	6	135	Yes	Yes	Yes	Yes	5,426	Yes
Westmont Sanatorium, Glens Falls	40	8	48	35	6	41	33	60	3	58	10	1	..	3	3	25	Yes	Yes	Yes	Yes	...	Yes
Oak Mount Sanatorium, Holcomb	37	8	45	..	..	80	67	50	..	45	15	1	..	3	3	19	Yes	Yes	Yes	Yes	127	No
Suffolk Sanatorium, Holtsville	54	50	104	47	63	110	109	103	27	104	10	3	5	6	5	38	Yes	Yes	Yes	Yes	696	...
Ulster County Tuberculosis Hospital, Kingston	56	..	56	..	..	89	88	56	2	50	18	2	8	5	8	34	Yes	Yes	Yes	Yes	822	Yes
Niagara County Sanatorium, Lockport	120	80	200	81	77	158	142	210	3	203	45	4	4	25	10	119	Yes	Yes	Yes	Yes	1,432	Yes
Saratoga County Tuberculosis Hospital, Middle Grove	50	40	90	82	102	184	194	82	12	86	13	1	4	2	11	29	Yes	Yes	No	Yes	...	No
Otsego County Sanatorium, Mt. Vision	26	..	26	25	1	26	26	15	..	17	4	1	2	3	2	8	Yes	Yes	Yes	Yes	6	No
Estelle and Walter C. Odell Memorial Sanat. for Tuberculosis, Newburgh	50	..	50	54	2	56	63	45	3	48	15	1	1	5	0	19	Yes	Yes	Yes	Yes	326	Yes
Rocky Crest Sanatorium, Olean	40	..	40	54	10	64	74	36	..	41	7	1	7	2	3	28	Yes	Yes	No	Yes	676	Yes
Columbia County Tuberculosis Sanatorium, Philmont	48	28	76	48	13	61	79	50	..	65	7	1	2	9	..	30	Yes	Yes	Yes	Yes	195	Yes
Summit Park Sanatorium, Pomona	50	..	50	44	..	44	44	50	3	50	6	1	10	2	6	24	Yes	Yes	Yes	Yes	1,071	Yes
Oswego County Sanatorium, Richland	85	30	115	82	28	110	108	99	..	98	18	1	8	10	4	40	Yes	Yes	Yes	Yes	53	Yes
Iola-Monroe County Tuberculosis Sanatorium, Rochester	270	130	400	340	307	647	630	395	10	390	62	7	..	45	18	211	Yes	Yes	Yes	Yes	2,564	Yes
Pine Crest Sanatorium, Salisbury Center	62	28	90	48	10	58	47	88	8	90	9	1	4	6	6	35	Yes	Yes	Yes	Yes	279	...
Glenridge Sanatorium, Schenectady	84	48	132	84	27	111	122	96	7	122	23	3	20	8	11	..	Yes	Yes	Yes	Yes	377	Yes
Chenango County Tuberculosis Hospital, Sherburne	37	..	37	34	2	36	36	28	1	35	8	1	5	2	4	8	Yes	Yes	Yes	Yes	...	...
Onondaga Sanatorium, Syracuse	203	50	253	179	54	233	239	233	3	236	58	4	..	18	19	126	Yes	Yes	Yes	Yes	1,149	Yes
Tompkins County Tuberculosis Hospital, Trumansburg	20	10	30	9	6	15	24	23	..	26	3	1	3	4	5	10	No	No	No	No	105	No
Oneida County Tuberculosis Sanatorium, Utica	108	24	132	102	13	115	115	128	13	129	33	3	8	16	6	64	Yes	Yes	Yes	Yes	4,368	Yes
Jefferson County Sanat., Watertown	50	28	78	42	17	59	59	80	8	80	8	2	1	7	4	30	Yes	Yes	Yes	Yes	572	Yes
Pawling Sanatorium, Wynantskill	118	34	152	111	19	130	136	122	2	132	23	3	7	7	9	..	Yes	Yes	Yes	Yes	...	Yes
City																						
Municipal Sanatorium, Otisville	388	..	388	547	..	547	547	320	..	336	1	8	30	24	0	256	Yes	Yes	Yes	Yes	5,091	No
J. N. Adam Memorial Hosp., Perrysburg	384	116	500	361	56	417	439	259	..	478	..	7	..	16	23	224	Yes	Yes	Yes	Yes	1,178	No
Neponsit Beach Hospital for Children, Rockaway Beach	..	120	120	..	25	25	31	115	..	119	3	1	2	8	21	77	Yes	No	Yes	....	...	No
Sea View Hospital, Staten Island	1,254	192	1,446	1,816	253	2,069	2,174	1,642	90	1,706	604	1	..	161	166	1,299	Yes	Yes	Yes	Yes	22,456	Yes
Gray Oaks Hospital, Yonkers	55	..	55	87	..	87	90	44	..	48	27	1	7	6	4	21	Yes	Yes	No	Yes	...	...
City-County																						
Samuel W. Bowne Memorial Hospital, Poughkeepsie	83	52	135	75	31	106	104	132	3	135	28	3	12	4	3	47	Yes	Yes	Yes	Yes	522	No
Private																						
Montefiore Hospital Country Sanatorium, Bedford Hills	230	..	230	249	..	249	261	208	10	226	3	4	3	10	13	111	Yes	Yes	Yes	Yes	2,423	No
Brooklyn Home for Consumptives, Brooklyn	97	12	109	69	6	75	82	104	15	109	23	2	15	8	1	48	Yes	Yes	Yes	Yes	504	Yes
Sanatorium Gabriels, Gabriels	132	..	132	74	..	74	84	73	..	88	4	2	3	8	0	20	Yes	Yes	Yes	Yes	327	No
Stony Wold Sanat., Lake Kushaqua	127	18	145	93	10	103	122	131	..	140	1	5	22	14	0	78	Yes	Yes	Yes	Yes	3,743	Yes
Workmen's Circle Sanatorium, Liberty	100	..	100	96	..	96	106	37	..	48	2	2	2	4	..	38	Yes	Yes	Yes	Yes	635	Yes
Potts Memorial Hospital, Livingston	55	..	55	24	..	24	25	53	25	54	..	2	4	2	1	22	Yes	Yes	Yes	Yes	544	Yes
Loomis Sanatorium, Loomis	128	..	128	147	..	147	163	101	..	99	8	6	1	14	5	106	Yes	Yes	Yes	Yes	1,580	No
St. Joseph's Hospital for Consumptives, New York City	295	..	295	586	..	586	581	267	..	256	147	2	5	9	20	102	Yes	Yes	Yes	No	...	No
Seton Hospital, New York City	386	101	487	630	75	705	477	461	..	560	147	7	13	16	12	171	Yes	Yes	Yes	Yes	1,526	...
St. John's Hospital, Ogdensburg	45	..	45	..	..	52	40	39	..	34	8	1	12	5	11	13	Yes	Yes	No	Yes	506	Yes
Dr. Shevell's Sanatorium, Otisville	..	..	15	..	..	25	20	5	..	6	..	2	..	..	..	1	Yes	Yes	Yes	Yes	...	No
Sunnyside Health Farm, Otisville	10	..	10	10	..	10	11	4	..	4	..	..	2	..	..	..	No	No	No	No	...	No
Samuel and Nettie Bowne Hospital, Poughkeepsie	50	..	50	46	..	46	51	33	..	32	13	1	2	9	1	36	Yes	Yes	Yes	Yes	250	No
National Variety Artists Lodge, Saranac Lake	75	..	75	40	..	40	35	57	..	47	12	4	2	5	2	43	Yes	Yes	Yes	Yes	720	No
Northwoods Sanatorium, Saranac Lake	..	..	26	..	..	39	39	23	..	24	4	2	..	3	..	13	No	No	No	Yes	200	...
Reception Hospital, Saranac Lake	..	..	20	..	..	43	45	18	3	18	3	1	9	2	2	10	No	Yes	No	Yes	...	No
St. Mary's of the Lake, Saranac Lake	30	..	30	..	..	42	14	17	..	19	3	..	..	..	..	6	No	No	No	Yes	...	...
Trudeau Sanatorium, Trudeau	180	..	180	257	..	257	278	172	..	180	5	5	5	22	20	114	Yes	Yes	Yes	Yes	1,073	No
St. Anthony's Hospital, Woodhaven	400	..	400	..	..	578	590	375	..	375	201	2	5	25	..	100	Yes	Yes	Yes	Yes	...	No
House of Rest at Sprain Ridge, Yonkers	76	24	100	71	19	90	86	65	..	68	1	1	2	1	6	36	No	No	No	No	...	No
Totals	8,127	1,462	9,650	8,336	1,806	11,631	11,591	8,734	328	9,202	2,033	166‡	311	746	469	4,913	51	50	46	52	73,462	27
NORTH CAROLINA																						
Federal—U.S.V.B.																						
Veterans Admin. Facility, Oteen	850	..	850	1,303	..	1,303	1,325	670	25	667	166	29	1	80	8	486	Yes	Yes	Yes	Yes	765	Yes
State																						
North Carolina Sanat. for the Treatment of Tuberculosis, Sanatorium	416	68	484	547	59	606	559	459	174	435	24	8	11	10	34	202	Yes	Yes	Yes	Yes	3,650	Yes
County																						
Halifax County Tuberculosis Sanitarium, Halifax	23	..	23	25	4	29	31	13	0	16	..	1	2	1	4	9	No	No	No	No	...	No
Scott Parker Sanatorium, Henderson	14	..	14	..	..	10	9	12	0	11	3	1	0	1	1	3	Yes	No	No	Yes	47	...
Mecklenburg Sanatorium, Huntersville	122	40	162	102	21	123	114	151	..	147	32	2	4	5	9	40	Yes	Yes	Yes	Yes	222	No
Guilford County Sanat., Jamestown	79	30	109	72	30	102	106	107	22	104	16	2	0	9	6	37	Yes	Yes	Yes	Yes	800	Yes
Wilkes County Tuberculosis Hut, North Wilkesboro	14	..	14	..	..	11	...	..	..	6	..	1	0	..	..	..	....	....	....	....	...	...
Edgecombe County Tuberculosis Sanitarium, Tarboro	134	..	134	..	..	25	...	..	..	18	..	1	0	1	1	5	No	No	No	No	...	No
Forsyth County Sanat., Winston-Salem	..	..	30	134	..	134	135	132	25	131	16	3	0	12	1	41	Yes	Yes	Yes	Yes	560	Yes
Private																						
Ambler Heights Sanit., Asheville	..	..	26	..	..	42	...	14	..	15	..	1	5	3	0	14	Yes	Yes	No	....	...	No
Elmhurst Cottage Sanat., Asheville	23	..	23	20	..	20	14	15	..	15	5	..	..	1	1	4	No	No	No	No	91	...

* Does not include physicians.
† Partly unclassified.
‡ Includes medical directors of three state sanatoriums not in operation at time of survey.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians		Nurses		Total Employees*	Medical Facilities				Total Pneumothorax Treatments	Outpatient Department
NORTH CAROLINA—Continued	Adults	Children	Total†	Adults	Children	Total†						Regular Staff	Attending and Consulting	Graduate	Other		X-Ray	Fluoroscopic	Laboratory	Pneumothorax		
Fairview Cottage Sanit., Asheville	..	..	130	..	..	36	...	18	0	25	..	..	..	2	0	12	No	No	No	No	...	...
Roye Cottage Sanitarium, Asheville	..	..	30	..	..	15	...	7	..	18	..	..	..	1	0	6	No	No	No	No	...	No
St. Joseph's Sanatorium, Asheville	..	..	96	..	..	83	...	48	..	61	..	1	0	8	0	36	Yes	Yes	....	Yes	...	...
Sunset Heights, Asheville	..	..	35	..	..	43	...	7	..	14	1	0	10	2	0	7	No	No	No	Yes	...	No
Violet Hill Sanatorium, Asheville	..	..	37	..	..	22	...	17	..	22	..	1	0	3	0	10	No	No	No	Yes	...	No
Zephyr Hill Sanatorium, Asheville	..	..	30	..	..	33	...	23	..	21	..	1	3	3	0	9	No	Yes	No	....	...	...
Hillcroft Sanatorium, Biltmore	..	..	50	..	..	27	30	17	0	17	5	..	6	3	0	10	No	No	No	Yes	...	No
Cragmont Sanatorium, Black Mountain	30	..	30	23	..	23	14	15	0	15	0	1	2	2	0	11	No	Yes	Yes	Yes	...	No
Fellowship Sanatorium of the Royal League, Black Mountain	..	..	25	..	..	6	...	18	..	15	..	1	2	1	..	6	Yes	Yes	No	No	...	No
Edgemont Sanatorium, Hendersonville	..	..	24	..	..	..	...	..	..	8	..	1	..	..	..	..	....	....	....	....	...	...
Pine-Crest Manor Sanat., Southern Pines	60	..	60	..	..	117	87	44	0	35	3	2	..	6	..	20	Yes	Yes	Yes	Yes	680	...
Wilmington Red Cross Sanitarium, Wilmington	36	..	36	25	1	26	21	30	5	25	11	2	2	4	0	11	Yes	Yes	Yes	Yes	212	Yes
Totals	1,801	138	2,452	2,251	115	2,836	2,445	1,817	251	1,841	282	59	48	158	65	979	11	12	8	13	7,027	5
NORTH DAKOTA																						
State																						
North Dakota State Tuberculosis Sanatorium, San Haven	215	50	265	162	38	200	174	249	97	239	29	4	1	28	2	124	Yes	Yes	Yes	Yes	2,924	No
Totals	215	50	265	162	38	200	174	249	97	239	29	4	1	28	2	124	1	1	1	1	2,924	0
OHIO																						
State																						
Ohio State Sanatorium, Mt. Vernon	240	..	240	399	..	399	399	232	..	231	..	1	3	6	1	56	Yes	Yes	Yes	Yes	2,075	No
County																						
Edwin Shaw Sanatorium, Akron	118	90	208	123	..	123	117	207	..	211	18	3	13	20	2	150	Yes	Yes	Yes	Yes	2,476	Yes
Pleasant View Sanatorium, Amherst	46	50	96	93	9	102	89	96	54	97	16	2	..	6	8	40	Yes	Yes	Yes	Yes	921	No
Molly Stark Sanatorium, Canton	128	39	167	191	42	233	241	125	..	157	51	2	13	9	19	89	Yes	Yes	Yes	Yes	2,605	No
Mount Logan Sanatorium, Chillicothe	58	..	58	46	1	47	40	56	40	52	11	1	2	4	1	18	Yes	Yes	Yes	Yes	687	...
Hamilton County Tuberculosis Sanatorium, Cincinnati	496	138	634	511	111	622	500	619	66	561	145	11	17	20	83	336	Yes	Yes	Yes	Yes	4,626	Yes
Franklin County Sanatorium, Columbus	160	50	210	171	55	226	213	209	13	205	63	2	19	11	7	71	Yes	Yes	Yes	Yes	1,436	Yes
Stillwater Sanatorium, Dayton	64	30	94	..	..	131	131	94	50	93	31	2	5	7	8	39	Yes	Yes	Yes	Yes	1,215	No
District Tuberculosis Hospital, Lima	110	19	129	97	12	109	106	106	..	107	29	2	4	14	6	61	Yes	Yes	Yes	Yes	731	Yes
Licking County Tuberculosis Sanatorium, Newark	52	4	56	120	4	124	73	50	..	51	..	2	11	7	4	27	Yes	Yes	Yes	Yes	167	Yes
Belmont Sanatorium, St. Clairsville	56	..	56	41	..	41	41	53	..	54	15	1	..	5	0	26	Yes	Yes	Yes	Yes	...	Yes
Clark County Tuberculosis Sanatorium, Springfield	95	25	120	..	..	105	103	219	6	110	22	2	5	9	8	40	Yes	Yes	Yes	Yes	293	Yes
Lucas County Tuberculosis Hospital, Toledo	96	94	190	111	72	183	175	150	..	163	45	1	35	3	17	27	Yes	Yes	Yes	Yes	816	No
Trumbull County Tuberculosis Sanatorium, Warren	48	..	48	75	10	85	64	48	..	47	18	1	..	6	1	23	Yes	Yes	Yes	Yes	542	Yes
Mahoning Tuberculosis Sanatorium, Youngstown	112	..	112	..	..	130	131	112	50	111	36	1	1	13	0	50	Yes	Yes	Yes	Yes	1,074	Yes
City																						
Convalescent Tuberculosis Hospital, Cleveland	..	..	48	..	..	32	...	..	..	44	..	1	..	1	..	..	No	No	No	No	...	...
City-County																						
Sunny Acres, Cleveland Tuberculosis Sanatorium, Warrensville	354	108	462	335	121	456	454	423	27	419	34	7	6	27	11	196	Yes	Yes	Yes	Yes	8,889	Yes
Private																						
Oak Ridge Sanatorium, Green Springs	90	10	100	74	..	74	31	47	..	30	13	2	..	6	6	22	Yes	Yes	Yes	Yes	424	Yes
Rocky Glen Sanatorium, McConnellsville	114	6	120	..	..	116	119	110	2	107	38	3	..	15	..	57	Yes	Yes	Yes	Yes	450	...
Avalon Sanatorium, Mt. Vernon	..	..	18	..	..	33	...	14	..	17	..	2	..	3	1	6	Yes	Yes	Yes	Yes	...	No
Mount Royal Sanat., North Royalton	48	..	48	73	..	73	65	48	..	45	..	2	8	6	..	26	Yes	Yes	Yes	Yes	1,069	Yes
Totals	2,485	663	3,214	2,460	437	3,444	3,092	3,018	308	2,912	585	51	142	198	183	1,360	20	20	20	20	30,496	12
OKLAHOMA																						
Federal—U.S.I.A.																						
Shawnee Indian Sanatorium, Shawnee	150	..	150	203	..	203	188	123	30	124	14	2	7	9	0	35	Yes	Yes	Yes	Yes	271	Yes
Choctaw-Chickasaw Sanat., Talihina	30	45	75	24	34	58	43	72	25	65	0	1	3	4	0	23	Yes	Yes	Yes	Yes	156	Yes
State																						
Western Oklahoma Tuberculosis Sanatorium, Clinton	228	..	228	404	..	404	388	225	203	222	80	3	8	5	10	60	Yes	Yes	Yes	Yes	1,819	Yes
Soldiers Tubercular Sanat., Sulphur	109	..	109	98	..	98	63	105	0	94	9	2	2	5	4	51	Yes	Yes	Yes	Yes	600	Yes
Eastern Oklahoma State Tuberculosis Sanatorium, Talihina	198	68	266	300	63	363	369	247	149	250	19	3	..	2	21	71	Yes	Yes	Yes	Yes	1,045	No
Private																						
Farm Sanatorium, Oklahoma City	..	..	60	90	2	92	90	19	..	14	4	2	..	1	4	12	No	No	No	Yes	1,188	No
Totals	715	113	888	1,119	99	1,218	1,141	791	407	769	126	13	20	26	39	252	5	5	5	6	5,079	4
OREGON																						
State																						
Oregon State Tuberculosis Hosp., Salem	..	..	270	155	35	190	174	266	69	262	39	3	5	10	3	81	Yes	Yes	Yes	Yes	2,170	Yes
Eastern Oregon Tuberculosis Hospital, The Dalles	139	..	139	103	..	103	101	137	21	136	22	1	4	14	..	47	Yes	Yes	Yes	Yes	1,224	Yes
County																						
Multnomah County Tuberculosis Pavilion, Troutdale	..	..	39	..	..	65	...	..	..	39	..	2	..	4	..	10	No	No	No	No	...	...
Private																						
Portland Open Air Sanat., Milwaukie	..	..	65	104	..	104	110	38	0	31	..	1	..	5	3	22	Yes	Yes	Yes	Yes	573	No
Totals	139	..	513	362	35	462	385	441	90	468	61	7	9	33	6	160	3	3	3	3	3,967	2
PENNSYLVANIA																						
State																						
Pennsylvania State Sanatorium for Tuberculosis No. 2, Cresson	570	270	840	458	435	893	897	828	332	852	104	6	7	13	45	296	Yes	Yes	Yes	Yes	2,606	...
Hamburg State Sanatorium for Tuberculosis, Hamburg	540	...	540	497	..	497	510	552	285	545	129	6	6	15	12	234	Yes	Yes	Yes	Yes	1,200	No

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians		Nurses		Total Employees*	Medical Facilities				Total Pneumothorax Treatments	Outpatient Department
	Adults	Children	Total†	Adults	Children	Total†						Regular Staff	Attending and Consulting	Graduate	Other		X-Ray	Fluoroscopic	Laboratory	Pneumothorax		
PENNSYLVANIA—Continued																						
Pennsylvania State Sanatorium for Tuberculosis, South Mountain	820	215	1,035	849	573	1,422	1,292	1,023	473	934	63	7	5	13	37	356	Yes	Yes	Yes	Yes	2,730	Yes
County																						
Beaver County Sanatorium, Monaca	63	..	63	122	..	122	125	63	10	63	37	1	10	1	9	30	Yes	Yes	Yes	Yes	373	No
Berks County Tuberculosis Sanatorium, Reading	80	54	134	100	61	161	165	133	23	132	25	2	15	13	0	43	Yes	Yes	Yes	Yes	630	Yes
Lackawanna County Tuberculosis Hospital, Scranton	120	20	140	120	9	129	121	138	25	137	42	1	1	5	7	50	No	No	Yes	Yes	1,560	...
City																						
Leech Farm Sanatorium, Pittsburgh	246	44	290	221	52	273	281	278	66	275	69	3	3	18	0	79	Yes	Yes	Yes	Yes	338	No
City-County																						
Rossmere Sanatorium, Lancaster	55	2	57	95	4	99	103	53	18	53	15	2	27	6	0	19	No	Yes	Yes	Yes	250	No
Private																						
Devitt's Camp for Tuberculosis, Allenwood	110	..	110	201	..	201	186	72	0	74	..	3	2	9	4	46	Yes	Yes	Yes	Yes	1,820	Yes
Eagleville Sanatorium for Consumptives, Eagleville	..	..	188	167	31	198	210	169	40	170	24	3	36	15	21	100	Yes	Yes	Yes	Yes	2,923	Yes
Louise Home Sanatorium, Erie	16	..	16	23	..	23	23	17	0	16	1	1	..	1	0	4	No	No	No	Yes	304	No
Grand View Sanatorium, Oil City	53	..	53	25	4	29	30	10	0	13	..	1	7	3	0	12	Yes	Yes	Yes	Yes	44	No
Home for Consumptives, Philadelphia	80	25	105	..	..	84	89	100	12	92	26	3	4	8	12	61	Yes	Yes	Yes	Yes	562	...
Rush Hospital for Consumption and Allied Diseases, Philadelphia	106	72	178	..	..	541	446	85	20	72	..	1	29	12	8	63	Yes	Yes	Yes	Yes	162	No
Tuberculosis League Hosp., Pittsburgh	150	..	150	192	6	198	191	148	..	147	22	4	7	6	32	85	Yes	Yes	Yes	Yes	4,046	Yes
Sunnyrest Sanatorium, White Haven	..	..	40	5	..	5	5	0	..	3	..	..	13	1	..	4	No	No	No	No	...	...
White Haven Sanat., White Haven	250	..	250	338	..	338	352	217	0	230	82	6	17	14	26	124	Yes	Yes	Yes	Yes	1,169	No
Totals	3,259	702	4,189	3,413	1,175	5,213	5,026	3,886	1,304	3,808	639	50	189	153	213	1,606	13	14	15	16	20,717	5
RHODE ISLAND																						
State																						
Rhode Island State Sanatorium, Wallum Lake	363	67	430	340	40	380	383	388	7	415	65	7	4	7	43	150	Yes	Yes	Yes	Yes	9,894	Yes
Private																						
St. Joseph's Sanatorium, Hillsgrove	65	..	65	32	..	32	29	47	2	47	14	2	0	2	2	20	No	No	No	No	...	No
Totals	428	67	495	372	40	412	412	435	9	462	79	9	4	9	45	170	1	1	1	1	9,894	1
SOUTH CAROLINA																						
State																						
South Carolina Sanatorium, State Park	229	48	277	210	57	267	267	225	..	254	31	4	3	8	11	90	Yes	Yes	Yes	Yes	1,661	Yes
County																						
Florence-Darlington Tuberculosis Sanatorium, Florence	46	..	46	53	4	57	31	45	39	43	20	2	8	5	3	13	Yes	Yes	Yes	Yes	1,500	Yes
Greenville County Sanat., Greenville	54	16	70	..	..	100	...	..	..	67	..	1	0	8	2	25	Yes	Yes	Yes	Yes	...	...
Pinehaven Sanatorium, Navy Yard	50	..	50	59	10	69	67	53	50	50	2	1	3	5	0	15	Yes	Yes	Yes	Yes	570	Yes
City-County																						
Camp Alice, Sumter County Tuberculosis Sanitarium, Sumter	26	..	26	..	..	81	28	24	4	20	6	1	1	2	0	5	No	No	No	No	...	No
Private																						
Ridgewood Tuberculosis Camp, Ridgewood	70	..	70	41	..	41	44	40	13	30	4	1	5	3	3	18	No	No	No	Yes	90	Yes
Totals	475	64	539	363	71	565	437	387	106	464	63	10	20	31	19	166	4	4	4	5	3,821	4
SOUTH DAKOTA																						
State																						
South Dakota State Sanatorium for Tuberculosis, Sanator	192	..	192	101	..	101	93	205	38	160	20	2	0	5	20	80	Yes	Yes	Yes	Yes	250	No
Totals	192	..	192	101	..	101	93	205	38	160	20	2	0	5	20	80	1	1	1	1	250	0
TENNESSEE																						
County																						
Davidson County Tuberculosis Hospital, Nashville	249	51	300	196	83	279	279	228	95	230	51	7	4	13	20	80	Yes	Yes	Yes	Yes	4,349	Yes
City-County																						
Beverly Hills Sanatorium, Knoxville	135	28	163	128	28	156	184	120	0	142	44	2	0	3	12	40	Yes	Yes	Yes	Yes	315	Yes
Oakville Memorial Sanat., Oakville	250	90	340	204	45	249	225	280	32	266	103	4	0	21	0	90	Yes	Yes	Yes	Yes	...	Yes
Private																						
Pine Breeze Sanatorium, Chattanooga	135	90	225	162	67	229	231	220	27	213	59	3	10	11	14	58	Yes	Yes	Yes	Yes	168	Yes
Officer Sanatorium, Monterey	..	..	12	..	..	26	20	6	0	6	..	1	0	1	1	4	No	No	No	Yes	100	No
International Printing Pressmen and Assistants' Union Sanatorium, Pressmen's Home	44	..	44	10	..	10	10	18	0	20	5	2	0	3	0	15	Yes	Yes	Yes	Yes	103	No
Wautauga Sanitarium, Ridgetop	..	..	40	30	..	30	15	15	0	14	..	1	3	2	0	9	Yes	Yes	Yes	Yes	300	No
Totals	813	259	1,124	730	223	979	964	887	154	891	262	20	17	54	47	296	6	6	6	7	5,335	4
TEXAS																						
State																						
State Tuberculosis Sanat., Sanatorium	556	162	718	1,507	347	1,944	1,935	697	373	692	26	8	0	16	45	212	Yes	Yes	Yes	Yes	3,104	No
County																						
Jefferson County Tuberculosis Hospital, Beaumont	64	18	82	74	10	84	89	82	3	77	11	1	0	4	6	29	No	Yes	Yes	Yes	696	No
Jefferson County Tuberculosis Hospital (col.), Beaumont	20	..	20	41	1	42	46	20	2	19	20	1	0	3	0	7	No	No	No	Yes	85	No
City-County																						
Woodlawn Sanatorium, Dallas	110	10	120	214	6	220	234	115	10	109	70	1	0	10	6	38	Yes	Yes	Yes	Yes	492	No
Elmwood Sanatorium, Ft. Worth	50	..	50	41	..	41	34	50	20	48	6	1	0	2	2	9	No	No	No	No	16	No
Houston Tuberculosis Hosp., Houston	122	50	172	278	100	378	390	164	..	163	54	1	0	7	7	40	No	No	No	Yes	617	...
Private																						
Hendricks-Laws Sanatorium, El Paso	..	..	88	88	4	92	61	68	0	32	4	2	0	3	1	14	Yes	Yes	Yes	Yes	199	No
Homan Sanatorium, El Paso	..	..	110	..	..	125	...	44	..	80	7	3	0	4	2	25	Yes	Yes	Yes	Yes	...	...
Long Sanatorium, El Paso	40	..	40	120	..	120	80	40	0	23	..	1	1	2	1	13	Yes	Yes	Yes	Yes	480	Yes
Price Sanatorium, El Paso	20	..	20	33	..	33	13	20	0	20	2	1	5	1	1	7	No	Yes	Yes	Yes	...	No
St. Joseph's Sanatorium, El Paso	..	..	75	128	1	129	69	60	..	54	9	2	6	6	0	30	Yes	Yes	Yes	Yes	490	Yes
Southern Baptist Sanatorium, El Paso	..	..	85	..	..	94	100	65	..	60	10	2	0	5	1	18	Yes	Yes	Yes	Yes	400	No
Thompson Sanatorium, Kerrville	..	..	86	98	6	104	89	50	0	38	8	3	0	6	0	23	Yes	Yes	Yes	Yes	550	No
Dr. Farmer's Sanatorium, San Antonio	30	..	30	40	..	40	23	17	0	10	1	1	0	1	2	10	No	No	Yes	Yes	50	No

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS HOSPITALS AND SANATORIUMS—Continued

	Bed Capacity			Patients Admitted			Patients Discharged (Including Deaths)	Patients Present	Waiting List	Daily Average	Deaths	Physicians: Regular Staff	Physicians: Attending and Consulting	Nurses: Graduate	Nurses: Other	Total Employees*	Medical Facilities: X-Ray	Medical Facilities: Fluoroscope	Medical Facilities: Laboratory	Medical Facilities: Pneumothorax	Total Pneumothorax Treatment	Outpatient Department
TEXAS—Continued	Adults	Children	Total†	Adults	Children	Total†																
Grace Lutheran Sanatorium for Tuberculosis, San Antonio	..	..	50	..	..	81	59	26	..	35	7	1	0	..	..	..	Yes	Yes	Yes	Yes	120	...
Woodmen of the World War Memorial Hospital, San Antonio	180	..	180	118	..	118	148	98	..	101	18	3	4	7	0	48	Yes	Yes	Yes	Yes	205	No
Von Ormy Cottage Sanat., Von Ormy	..	..	45	40	..	40	19	41	0	38	5	1	0	1	4	12	No	Yes	No	Yes	65	No
Totals	1,192	240	1,971	2,910	475	3,685	3,389	1,657	408	1,599	258	33	16	78	78	535	10	13	13	16	7,569	2
VERMONT																						
State																						
Washington County Sanat., Barre	47	..	47	63	..	63	59	47	1	41	26	1	0	2	10	13	Yes	Yes	Yes	Yes	531	No
Vermont Sanatorium, Pittsford	80	..	80	74	..	74	70	69	12	72	12	2	0	5	2	25	Yes	Yes	Yes	Yes	1,020	No
Totals	127	..	127	137	..	137	129	116	13	113	38	3	0	7	12	38	2	2	2	2	1,551	0
VIRGINIA																						
State																						
Piedmont Sanatorium (col.), Burkeville	150	..	150	..	..	194	185	143	76	132	61	3	0	6	16	74	Yes	Yes	Yes	Yes	...	No
Catawba Sanatorium, Catawba	340	..	340	..	..	401	357	301	92	296	30	5	0	22	25	130	Yes	Yes	Yes	Yes	...	No
Blue Ridge Sanatorium, Charlottesville	230	40	270	299	58	357	338	259	..	256	26	6	0	10	27	107	Yes	Yes	Yes	Yes	...	No
City																						
Pine Camp Hospital, Brook Hill	190	24	214	114	16	130	131	147	..	155	46	6	12	7	15	57	Yes	Yes	Yes	Yes	2,037	Yes
Charles R. Grandy Sanat., Norfolk	64	..	64	..	..	123	110	83	..	82	..	1	1	5	2	15	Yes	Yes	Yes	Yes	800	No
Private																						
Hilltop Sanatorium, Danville	40	20	60	73	50	123	125	58	4	50	4	1	3	3	5	9	Yes	Yes	No	Yes	200	Yes
Mount Regis Sanatorium, Salem	..	..	25	31	2	33	46	11	0	14	2	1	0	3	1	13	Yes	Yes	Yes	Yes	350	Yes
Totals	1,014	84	1,123	517	126	1,361	1,292	1,002	172	985	169	23	16	56	91	405	7	7	6	7	3,387	3
WASHINGTON																						
Federal—U.S.I.A.																						
Yakima Sanitarium, Toppenish	40	..	40	29	..	29	32	36	10	41	6	1	3	4	0	12	Yes	Yes	Yes	Yes	174	Yes
County																						
Oakhurst Sanatorium, Elma	51	14	65	87	31	118	113	70	5	67	21	1	0	6	2	19	Yes	Yes	Yes	Yes	580	Yes
Mountain View Sanatorium, Lakeview	125	30	155	82	36	118	72	142	2	140	..	1	0	12	0	45	Yes	Yes	Yes	Yes	2,000	Yes
King County Tuberculosis Hosp., Seattle	..	..	175	163	..	163	160	159	35	152	..	2	2	18	0	45	No	Yes	Yes	Yes	1,090	Yes
Aldercrest Sanatorium, Snohomish	40	..	40	24	1	25	17	39	5	39	..	1	1	3	5	15	Yes	Yes	Yes	Yes	...	...
Edgecliff Sanatorium, Spokane	117	23	140	..	..	97	99	111	0	111	35	2	2	9	11	55	Yes	Yes	Yes	Yes	...	No
Private																						
Laurel Beach Sanatorium, Seattle	..	..	60	138	3	141	130	45	..	42	14	3	1	6	7	21	Yes	Yes	Yes	Yes	624	...
Riverton Sanatorium, Seattle	..	..	60	79	..	79	96	18	0	35	15	1	3	4	0	10	Yes	Yes	Yes	Yes	163	No
Bellevue Sanatorium, Tacoma	16	..	16	16	..	16	11	11	0	10	4	1	1	2	0	5	No	No	No	Yes	700	No
Totals	389	67	751	618	71	786	790	631	57	637	95	13	13	64	25	227	7	8	8	9	5,331	4
WEST VIRGINIA																						
State																						
Pinecrest Sanitarium, Beckley	143	..	143	143	..	143	166	137	75	120	24	3	3	23	0	45	Yes	Yes	Yes	Yes	1,488	Yes
Denmar Sanitarium (col.), Denmar	65	20	85	..	..	63	57	66	3	62	21	1	0	4	..	22	No	No	No	No	...	...
Hopemont Sanitarium, Hopemont	360	60	420	406	52	458	443	400	43	401	40	5	3	26	23	..	Yes	Yes	Yes	Yes	...	Yes
County																						
Grandview Sanatorium, Moundsville	27	5	32	..	..	47	35	28	0	24	6	1	0	3	2	9	No	No	No	Yes	...	No
Ohio County Tuberculosis Sanatorium, Wheeling	17	..	17	..	..	26	21	17	6	17	4	1	0	1	3	10	No	No	No	No	...	...
Private																						
Hillcrest Sanatorium, Charleston	..	42	42	..	..	16	19	40	6	40	2	1	0	0	3	9	No	No	No	No	...	No
Eastmont Tuberculosis Sanatorium, Morgantown	24	9	33	23	21	44	25	30	..	28	3	1	6	4	0	9	No	No	No	No	...	No
Totals	636	136	772	572	73	797	766	718	133	692	100	13	12	61	31	104	2	2	2	3	1,488	2
WISCONSIN																						
State																						
Lake Tomahawk State Camp, Lake Tomahawk	42	..	42	49	..	49	48	41	5	40	..	3	2	0	0	22	(Rehabilitation service)					
Wisconsin State Sanatorium, Statesan	240	..	240	147	..	147	163	210	19	217	30	4	2	10	19	113	Yes	Yes	Yes	Yes	832	No
County																						
Mount Washington Sanat., Eau Claire	58	..	58	44	2	46	46	58	8	58	8	1	1	4	4	23	No	No	No	Yes	402	No
Middle River Sanatorium, Hawthorne	135	..	135	71	..	71	57	121	..	128	21	2	1	17	5	53	Yes	Yes	Yes	Yes	449	Yes
Pinehurst Sanatorium, Janesville	68	..	68	..	..	86	85	60	3	57	12	1	8	8	2	28	Yes	Yes	Yes	Yes	488	Yes
Forest Lawn Sanatorium, Jefferson	54	..	54	30	..	30	21	54	5	52	11	1	0	5	2	22	Yes	Yes	Yes	Yes	350	No
Riverview Sanatorium, Kaukauna	65	..	65	50	..	50	54	61	0	62	16	1	1	5	6	28	Yes	Yes	Yes	Yes	509	Yes
Willowbrook Sanatorium, Kenosha	32	6	38	21	4	25	28	33	8	35	7	1	0	3	2	17	Yes	Yes	Yes	Yes	56	No
Lake View Sanatorium, Madison	130	10	140	67	1	68	69	108	9	105	10	3	6	17	7	55	Yes	Yes	Yes	Yes	605	Yes
Oak Forest Sanatorium, Onalaska	60	..	60	..	..	73	72	61	4	59	12	1	2	8	1	28	Yes	Yes	Yes	Yes	298	No
Oak Sanatorium, Pewaukee	38	..	38	39	..	39	35	38	0	35	7	1	2	4	0	14	Yes	Yes	Yes	Yes	235	No
Rocky Knoll Sanatorium, Plymouth	74	14	88	68	19	87	86	85	4	86	17	1	11	9	5	48	Yes	Yes	Yes	Yes	1,153	No
Purecair Sanatorium, Purecair	70	..	70	54	2	56	55	67	7	68	10	1	0	8	6	34	Yes	Yes	Yes	Yes	578	Yes
Sunny Rest Sanatorium, Racine	39	..	39	36	..	36	34	39	2	50	8	1	2	4	2	19	No	No	No	Yes	574	No
Mount View Sanatorium, Wausau	66	..	66	74	1	75	71	65	2	61	17	1	8	11	3	35	Yes	Yes	Yes	Yes	421	Yes
Muirdale Sanatorium, Wauwatosa	405	53	458	447	170	617	594	451	15	436	101	4	9	20	16	165	Yes	Yes	Yes	Yes	3,861	Yes
Hickory Grove Sanat., West DePere	84	6	90	..	..	153	...	82	2	82	10	1	0	7	4	28	Yes	Yes	Yes	Yes	...	...
Maple Crest Sanatorium, Whitelaw	50	..	50	33	..	33	32	43	..	43	10	1	0	6	2	19	Yes	Yes	Yes	Yes	611	...
Sunny View Sanatorium, Winnebago	62	31	93	91	36	127	119	91	6	86	12	1	2	10	4	39	Yes	Yes	Yes	Yes	369	No
Private																						
Morningside Sanatorium, Madison	25	20	45	17	6	23	25	33	1	39	2	1	0	3	2	15	No	No	No	Yes	...	No
River Pines Sanatorium, Stevens Point	..	..	52	58	..	58	50	45	0	44	9	1	0	6	2	24	Yes	Yes	Yes	Yes	...	...
Totals	1,797	140	1,989	1,396	241	1,949	1,744	1,846	100	1,843	330	32	57	165	94	829	17	17	17	20	11,991	7
WYOMING																						
State																						
Wyoming Tuberculosis Sanat., Basin	33	..	33	31	..	31	31	29	0	28	10	1	1	2	2	17	Yes	Yes	Yes	Yes	196	Yes
Totals	33	..	33	31	..	31	31	29	0	28	10	1	1	2	2	17	1	1	1	1	196	1
Grand total (all states)	49754	9036	64997	50460	10394	70601	66423	56579	8991	56325	10923	1154	2195	4258	3419	26359	364	368	364	406	450100	186

* Does not include physicians.
† Partly unclassified.

TUBERCULOSIS DEPARTMENTS OF HOSPITALS

INCLUDING GENERAL AND SPECIAL HOSPITALS

	Type of Service	Total Capacity of Hospital	Tuberculosis Department		
			Beds	Patients Admitted	Patients Present
ALABAMA					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Mobile	Gen	190	4	16	2
U.S.V.B.					
Veterans Admin. Facility, Tuscaloosa	Gen	346	25	..	22
Veterans Admin. Facility (col.), Tuskegee	Gen	1,154	24	505	19
State					
Searcy Hospital (col.), Mt. Vernon	Ment	1,600	20	4	12
Bryce Hospital, Tuscaloosa	Ment	3,017	60	..	51
Partlow State School, Tuscaloosa	MeDe	620	..	..	3
State Convict Tuberculosis Hospital, Wetumpka	InstTB	87	87	94	42
Private					
Employees' Hospital of the Tennessee Coal, Iron and Railroad Company, Fairfield	Gen	287	..	64	1
Totals		7,301	220	683	152
ARIZONA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Tucson	G&TB	358	275	627	342
Veterans Admin. Facility, Whipple	G&TB	600	300	..	..
U.S.I.A.					
Kayenta Sanatorium, Kayenta	Gen	52	..	53	20
Pima Indian Hospital, Sacaton	Gen	50	..	62	3
San Carlos Indian Hosp., San Carlos	Gen	29	..	11	3
Indian Oasis Hospital, Sells	Gen	46	..	16	9
Western Navajo Hosp., Tuba City	Gen	46	..	16	2
Fort Apache Agency Hosp., Whiteriver	Gen	46	..	17	5
Fort Yuma Indian Hospital, Yuma	Gen	32	..	29	1
County					
Cochise County Hospital, Douglas	Gen	93	9	5	8
Pinal County Hospital, Florence	Gen	23	8	12	5
Yavapai County Hospital, Prescott	Inst	70	8	14	7
Private					
Booker T. Washington Memorial Hospital (col.), Phoenix	G&TB	22	13	12	10
St. Mary's Hosp. and Sanat., Tucson	G&TB	150	50	229	35
Southern Methodist Hospital and Sanatorium, Tucson	G&TB	75	30	55	20
Sage Memorial Hospital, Ganado	Gen	65	10	33	3
Totals		1,757	703	1,191	473
ARKANSAS					
Federal—U.S.A. and U.S.N.					
Army and Navy General Hospital, Hot Springs National Park	Gen	412	..	6	1
U.S.V.B.					
Veterans Admin. Facility, Fayetteville	Gen	258	59	38	32
Veterans Admin. Facility, North Little Rock	Ment	820	23	5	28
State					
State Hospital, Little Rock	Ment	3,593	100	..	..
Arkansas State Penitentiary Hospital, Tucker	Inst	20	8	4	2
County					
Pulaski County Hosp., Little Rock	Gen	200	22	32	14
Sebastian County Hosp., Ft. Smith	Inst	78	22	..	12
Totals		5,381	234	85	89
CALIFORNIA					
Federal—U.S.A.					
Letterman General Hosp., San Francisco	Gen	600	20	95	3
U.S.N.					
U. S. Naval Hospital, Mare Island	Gen	534	92	133	36
U. S. Naval Hospital, San Diego	Gen	800	29	57	16
U. S. Ship Relief, San Pedro	Gen	367	24	40	1
U.S.P.H.S.					
U. S. Marine Hospital, San Francisco	Gen	493	53	95	55
U.S.V.B.					
Veterans Admin. Facility, Livermore	G&TB	318	318	304	236
Veterans Admin. Facility, West Los Angeles	G&TB	1,232	280	423	130
Veterans Admin. Facility, Palo Alto	Ment	1,000	42	5	34
U.S.I.A.					
Fort Bidwell Sanatorium, Ft. Bidwell	G&TB	38	30	28	23
Hoopa Valley Indian Hospital, Hoopa	Gen	36	..	11	3
Soboba Indian Hospital, San Jacinto	Gen	30	..	15	5
State					
Agnews State Hospital, Agnew	Ment	3,059	30	..	28
Norwalk State Hospital, Norwalk	Ment	2,262	..	..	7
Patton State Hospital, Patton	Ment	3,697	140	23	135
Stockton State Hospital, Stockton	Ment	3,559	105	12	67
Mendocino State Hospital, Talmage	Ment	2,700	..	4	8
Folsom Prison Hospital, Represa	Inst	76	15	..	18
Charles L. Neumiller Hospital, San Quentin	Inst	137	50	..	50
Preston School of Industry Hospital, Waterman	Inst	42	..	3	1
County					
Riverside County Hospital, Arlington	G&TB	325	91	97	84
Santa Cruz County Hosp., Santa Cruz	G&TB	35	16	34	13
San Joaquin General Hospital, French Camp	Gen	550	55	138	42
Fresno County General Hosp., Fresno	Gen	510	92	155	94
Kings County Hospital, Hanford	Gen	93	6	25	3
Los Angeles County Hosp., Los Angeles	Gen	3,266	201	1,216	252
Madera County Hospital, Madera	Gen	43	..	21	2
Merced General Hospital, Merced	Gen	220	50	67	34
Stanislaus County Hospital, Modesto	Gen	209	12	14	11
Nevada County Hospital, Nevada City	Gen	62	4	8	4
Orange County Hospital, Orange	Gen	275	92	134	92
Shasta County Hospital, Redding	Gen	82	20	4	5

	Type of Service	Total Capacity of Hospital	Tuberculosis Department		
			Beds	Patients Admitted	Patients Present
CALIFORNIA—Continued					
Sacramento County Hosp., Sacramento	Gen	400	28	260	16
San Bernardino County Charity Hospital, San Bernardino	Gen	312	63	84	48
San Diego County General Hospital, San Diego	Gen	640	185	185	172
Fairmont Hospital of Alameda County, San Leandro	Gen	900	153	413	150
Community Hospital of San Mateo County, San Mateo	Gen	192	44	44	41
Santa Barbara General Hospital, Santa Barbara	Gen	215	56	63	53
Sonoma County Hospital, Santa Rosa	Gen	153	60	30	45
Ventura County Hospital, Ventura	Gen	182	40	44	32
Marin County Tuberculosis Hospital, San Rafael	Inst	16	16	32	16
City-County					
San Francisco Hosp., San Francisco	Gen	1,396	415	766	380
Private					
Sacred Heart Hospital, Hanford	Gen	20	..	2	1
Loma Linda Sanitarium and Hospital, Loma Linda	Gen	112	..	15	1
Cedars of Lebanon Hosp., Los Angeles	Gen	248	..	86	3
Western Pacific Railway Hosp., Portola	Gen	30	..	2	2
Ross General Hospital, Ross	Gen	60	18	51	18
French Hospital, San Francisco	Gen	226	..	35	6
San Pedro Hospital, San Pedro	Gen	88	4	8	..
Shriners Hospital for Crippled Children, San Francisco	Orth	50	..	67	2
Santa Fe Coast Lines Hospital, Los Angeles	Indus	150	..	19	1
Lane Sanitarium, San Diego	Conv	9	6	2	4
Totals		32,121	2,955	5,369	2,483
COLORADO					
Federal—U.S.A.					
Fitzsimons General Hospital, Denver	G&TB	1,185	536	915	447
U.S.V.B.					
Veterans Admin. Facility, Ft. Lyon	Ment	699	..	4	17
U.S.I.A.					
Edward T. Taylor Hospital, Ignacio	Gen	35	..	14	0
State					
Colorado State Hospital, Pueblo	Ment	3,120	34	..	65
Colorado State Penitentiary Hospital, Canon City	Inst	35	5	2	3
County					
Boulder County Hospital, Boulder	Gen	40	7	6	3
Island Grove County Hospital, Greeley	Inst	70	..	5	2
City-County					
Denver General Hospital, Denver	Gen	560	80	178	64
Private					
Glockner Sanatorium and Hospital, Colorado Springs	G&TB	150	62	70	50
St. Francis Hospital and Sanatorium, Colorado Springs	G&TB	136	75	63	40
Union Printers' Home and Tuberculosis Sanatorium, Colorado Springs	G&TB	176	100	50	55
Mennonite Hosp. and Sanit., La Junta	G&TB	70	18	7	14
Eben-Ezer Hospital, Brush	Gen	20	10	14	..
St. Joseph's Hospital and Sanatorium, Del Norte	Gen	25	10	6	8
St. Anthony's Hospital, Denver	Gen	200	6	11	10
St. Joseph's Hospital, Denver	Gen	200	5	20	6
Mount San Rafael Hospital, Trinidad	Gen	65	..	5	1
Totals		6,785	948	1,370	785
CONNECTICUT					
State					
Connecticut State Hosp., Middletown	Ment	3,024	46	..	88
Norwich State Hospital, Norwich	Ment	2,919	90	..	..
City					
Englewood Hospital, Bridgeport	TB Iso	150	40	92	24
Municipal Hospital, Greenwich	TB Iso	61	16	21	0
Municipal Hospitals, Hartford	GenIso	305	..	99	20
Private					
St. Mary's Hospital, Waterbury	Gen	220	6	31	..
William W. Winchester Hospital (Dept. of New Haven Hosp.), West Haven	Gen	397	42	119	42
Totals		7,076	240	362	174
DELAWARE					
State					
Delaware State Hospital, Farnhurst	Ment	978	..	5	13
Totals		978	..	5	13
DISTRICT OF COLUMBIA					
Federal—U.S.A.					
Walter Reed General Hospital, Washington	Gen	1,120	12	115	3
U.S.N.					
U. S. Naval Hospital, Washington	Gen	328	4	13	1
U.S.V.B.					
Veterans Admin. Facility, Washington	Gen	327	34	259	9
Other					
St. Elizabeth's Hospital (Psych.), Washington	Ment	5,275	146	30	110
City					
Gallinger Municipal Hosp., Washington	Gen	700	100	321	82
Private					
Washington Sanitarium and Hospital, Washington	Gen	170	..	12	0
Children's Hospital, Washington	Chil	182	..	25	5
Totals		8,102	296	775	210

	Type of Service	Total Capacity of Hospital	Tuberculosis Department: Beds	Tuberculosis Department: Patients Admitted	Tuberculosis Department: Patients Present
FLORIDA					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Key West	Gen	65	10	12	6
U.S.V.B.					
Veterans Admin. Facility, Lake City	Gen	307	16	102	22
State					
American Legion Hospital for Crippled Children, St. Petersburg	Orth	30	..	..	..
Florida State Hospital, Chattahoochee	Ment	4,125	48	..	46
Florida State Farm Hospital, Raiford	Inst	44	14	16	12
County					
Duval County Hospital, Jacksonville	Gen	170	37	61	28
Dade County Hospital, Miami	Gen	82	..	19	5
Pinellas County Home, Largo	InstTB	18	18	..	10
City					
Morrell Memorial Hospital, Lakeland	Gen	72	..	10	1
James M. Jackson Memorial Hospital, Miami	Gen	320	32	62	33
City Hospital (col.), St. Petersburg	Gen	25	10	6	0
Private					
University Hospital, Coral Gables	Gen	35	4	10	2
Centro Asturiano Hospital, Tampa	Gen	75	9	..	5
Harry-Anna Memorial Home for Crippled Children, Umatilla	Orth	35	..	14	6
Totals		5,403	198	312	176
GEORGIA					
Federal—U.S.A.					
Station Hospital, Ft. Benning	Gen	239	..	6	2
U.S.P.H.S.					
U. S. Marine Hospital, Savannah	Gen	165	9	17	5
U. S. Penitentiary Hospital, Atlanta	Inst	187	6	11	4
U.S.V.B.					
Veterans Admin. Facility, Atlanta	Gen	200	20	..	10
Veterans Admin. Facility, Augusta	Ment	966	46	8	46
State					
Milledgeville State Hosp., Milledgeville	Ment	6,150	466	..	466
Georgia State Penitentiary Tubercular Hospital, Milledgeville	InstTB	75	75	184	..
Private					
Charity Hospital (col.), Savannah	Gen	39	5	25	2
Totals		8,021	627	251	535
IDAHO					
Federal—U.S.V.B.					
Veterans Admin. Facility, Boise	Gen	303	24	19	12
State					
Idaho State Soldiers Home Hospital, Boise	Inst	27	12	..	1
Private					
St. Alphonsus Hospital, Boise	Gen	125	20	24	15
Coeur d'Alene Hospital, Coeur d'Alene	Gen	50	20	14	11
St. Joseph's Hospital, Lewiston	Gen	75	..	25	1
Page Hospital, Sandpoint	Gen	35	..	3	0
Wallace Hospital, Wallace	Gen	50	8	4	0
Totals		665	84	89	40
ILLINOIS					
Federal—U.S.A.					
Station Hospital, Ft. Sheridan	Gen	216	6	18	0
Station Hospital, Rantoul	Gen	50	6	2	0
U.S.P.H.S.					
U. S. Marine Hospital, Chicago	Gen	186	14	19	12
U.S.V.B.					
Veterans Admin. Facility, Hines	G&TB	1,750	250	491	250
Veterans Admin. Facility, Danville	Gen	562	38	57	19
Veterans Admin. Facility, North Chicago	Ment	1,135	35	4	24
State					
Infirmary of Clearing House Illinois Emergency Relief, Chicago	Gen	350	20	78	14
Research and Educational Hospital, Chicago	Gen	357	..	34	5
Alton State Hospital, Alton	Ment	1,537	159	..	140
Anna State Hospital, Anna	Ment	2,047	65	77	62
Chicago State Hospital, Chicago	Ment	4,118	..	5	42
Dixon State Hospital, Dixon	MeDe	3,323	156	..	134
East Moline State Hosp., East Moline	Ment	1,951	68	..	68
Elgin State Hospital, Elgin	Ment	3,900	110	15	185
Jacksonville State Hosp., Jacksonville	Ment	3,345	96	..	91
Kankakee State Hospital, Kankakee	Ment	4,000	100	30	130
Lincoln State School and Colony, Lincoln	MeDe	3,777	97	8	47
Peoria State Hospital, Peoria	Ment	2,771	48	10	203
Southern Illinois Penitentiary Hospital, Menard	Inst	36	9	12	4
Illinois State Reformatory Hospital, Pontiac	Inst	38	18	21	10
County					
Cook County Hospital, Chicago	Gen	3,300	327	1,240	335
Lake County General Hosp., Waukegan	Gen	90	24	..	..
City					
House of Correction Hospital, Chicago	Inst	75	6	51	2
Private					
Berwyn Hospital, Berwyn	Gen	75	..	6	..
Oakwood Hospital, Charleston	Gen	23	4	..	..
Ravenswood Hospital, Chicago	Gen	150	..	20	1
St. Joseph Hospital, Chicago	Gen	150	..	8	1
University of Chicago Clinics, Chicago	Gen	262	17	..	11
St. Elizabeth Hospital, Granite City	Gen	103	4	8	..
St. Francis Hospital, Kewanee	Gen	56	..	30	1
Olney Sanitarium, Olney	Gen	68	..	17	3
St. Francis Hospital, Peoria	Gen	300	..	24	2
St. Anthony's Hospital, Rock Island	Gen	150	..	10	1
Shriners Hospital for Crippled Children, Chicago	Orth	60	..	7	5
ILLINOIS—Continued					
St. John's Sanitarium, Springfield	TB Or	325	225	208	220
Country Home for Convalescent Crippled Children, West Chicago	Orth	120	..	..	..
Totals		40,756	1,902	2,510	2,022
INDIANA					
Federal—U.S.A.					
Station Hosp., Ft. Benjamin Harrison	Gen	167	..	3	1
U.S.P.H.S.					
U. S. Marine Hospital, Evansville	Gen	90	4	11	3
U.S.V.B.					
Veterans Admin. Facility, Indianapolis	Gen	152	..	42	4
Veterans Admin. Facility, Marion	Ment	1,500	80	20	74
State					
Fort Wayne State School, Ft. Wayne	MeDe	1,675	20	30	20
Central State Hospital, Indianapolis	Ment	1,729	25	6	20
Logansport State Hospital, Logansport	Ment	1,682	24	..	..
Madison State Hosp., North Madison	Ment	1,580	30	..	..
Indiana Women's Prison, Indianapolis	Inst	4	..	2	2
Indiana State Prison Hospital, Michigan City	Inst	100	30	..	14
Indiana State Reformatory Hospital, Pendleton	Inst	100	12	33	10
Private					
St. John Hospital (col.), Gary	Gen	15	4	9	2
Totals		8,794	229	156	150
IOWA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Des Moines	Gen	300	50	20	12
Veterans Admin. Facility, Knoxville	Ment	851	27	5	28
State					
University Hospitals, Iowa City	Gen	900	..	194	..
Cherokee State Hospital, Cherokee	Ment	1,670	72	..	55
Clarinda State Hospital, Clarinda	Ment	1,400	..	4	30
Iowa Institution for Feebleminded Children, Glenwood	MeDe	1,800	36	4	32
Independence State Hosp., Independence	Ment	1,735	..	5	61
Mount Pleasant State Hospital, Mount Pleasant	Ment	1,600	..	3	40
Hospital for Epileptics and School for Feebleminded, Woodward	MeDe	1,227	10	2	3
Reformatory Hospital, Anamosa	Inst	35	2	1	0
Iowa State Penitentiary Hospital, Ft. Madison	Inst	38	10	9	6
Private					
Iowa Lutheran Hospital, Des Moines	Gen	135	..	13	1
St. Francis Hospital, Grinnell	Gen	40	..	3	3
Totals		11,731	207	263	271
KANSAS					
Federal—U.S.P.H.S.					
U. S. Penitentiary Hosp., Leavenworth	Inst	180	..	4	1
U.S.V.B.					
Veterans Admin. Facility, Veterans Administration Home	Gen	741	67	158	58
Veterans Admin. Facility, Wichita	Gen	166	..	37	..
U.S.I.A.					
Haskell Institute Hospital, Lawrence	Inst	40	..	7	2
State					
Larned State Hospital, Larned	Ment	1,048	..	1	5
Osawatomie State Hosp., Osawatomie	Ment	1,580	60	15	75
Topeka State Hospital, Topeka	Ment	1,827	40	..	38
Kansas State Penitentiary Hosp., Lansing	Inst	50	10	8	2
Private					
St. Anthony Hospital, Dodge City	Gen	80	..	7	1
St. Catherine's Hospital, Garden City	Gen	41	..	5	..
St. Rose Hospital, Great Bend	Gen	70	..	9	4
Halstead Hospital, Halstead	Gen	170	..	10	2
St. Elizabeth Mercy Hosp., Hutchinson	Gen	50	..	6	1
St. Margaret's Hospital, Kansas City	Gen	250	..	33	2
Asbury Protestant Hospital, Salina	Gen	43	..	6	1
St. Mary's Hospital, Winfield	Gen	44	..	3	..
Suburban Rest Sanitarium, Wichita	Conv	30	6	7	2
Totals		6,410	183	316	194
KENTUCKY					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Louisville	Gen	100	..	3	2
State					
Western State Hospital, Hopkinsville	Ment	1,925	150	19	37
Central State Hospital, Lakeland	Ment	2,350	72	..	68
County					
McCracken County Tuberculosis Sanatorium, Paducah	InstTB	20	20	..	..
City					
Louisville City Hospital, Louisville	Gen	528	..	241	5
Private					
Red Bird Evangelical Hosp., Beverly	Gen	15	3	4	..
St. Elizabeth Hospital, Covington	Gen	263	..	30	10
Highway Medical Hospital, Florence	Gen	20	2	1	..
St. Joseph Infirmary, Louisville	Gen	320	7	..	7
Lynch Hospital, Lynch	Indus	50	3	6	..
Totals		5,591	257	304	129
LOUISIANA					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, New Orleans	Gen	572	49	..	35
U.S.V.B.					
Veterans Admin. Facility, Alexandria	Gen	439	157	330	91
State					
John Dibert Memorial Hospital (Charity Hospital), New Orleans	Gen	1,814	321	..	..

	Type of Service	Total Capacity of Hospital	Tuberculosis Department		
			Beds	Patients Admitted	Patients Present
LOUISIANA—Continued					
Shreveport Charity Hosp., Shreveport.	Gen	476	50	183	50
East Louisiana State Hospital, Jackson	Ment	3,535	..	4	90
Central Louisiana State Hospital, Pineville	Ment	1,785	150	22	110
Totals		8,621	727	539	376
MAINE					
Federal—U.S.A.					
Station Hospital, Cape Cottage	Gen	64	..	4	1
U.S.P.H.S.					
U. S. Marine Hospital, Portland	Gen	72	12	10	8
U.S.V.B.					
Veterans Admin. Facility, Augusta	Gen	275	..	57	0
State					
Augusta State Hospital, Augusta	Ment	1,350	18	..	..
Bangor State Hospital, Bangor	Ment	800	40	12	40
Pownal State School, Pownal	MeDe	820	..	7	5
Private					
Central Maine General Hosp., Lewiston	Gen	157	16	33	16
Queen's Hospital, Portland	Gen	48	..	2	1
Rumford Community Hosp., Rumford.	Gen	75	6	..	..
Kennebec Valley Hospital, Skowhegan..	Gen	37	2	..	2
Totals		3,788	94	125	73
MARYLAND					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Baltimore	Gen	278	20	39	19
U.S.V.B.					
Veterans Admin. Facility, Perry Point.	Ment	1,015	48	..	48
State					
Spring Grove State Hosp., Catonsville.	Ment	1,700	20	2	18
Crownsville State Hosp. (col.), Crownsville	Ment	1,020	10	..	20
Rosewood State Training School, Owings Mills	MeDe	1,126	..	28	26
Springfield State Hospital, Sykesville...	Ment	2,600	85	..	82
Maryland Penitentiary Hosp., Baltimore	Inst	44	10	11	4
Maryland House of Correction Hospital, Jessups	Inst	48	7	..	..
Private					
Children's Hospital School, Baltimore..	Orth	120	..	..	..
James L. Kernan Hospital and Industrial School for Crippled Children, Baltimore	Orth	80	..	..	..
Pinehurst Sanitarium, Hyattsville	NervTB	30	..	28	4
Totals		8,061	200	108	221
MASSACHUSETTS					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Chelsea	Gen	167	12	16	1
U. S. Marine Hospital, Vineyard Haven	Gen	24	4	2	2
U.S.V.B.					
Veterans Admin. Facility, Northampton	Ment	611	..	..	66
State					
Captain John Adams Hosp. at Soldiers' Home, Chelsea	Gen	241	6	37	5
State Infirmary, Tewksbury	Gen	3,110	280	244	190
Bridgewater State Hosp., Bridgewater..	Ment	988	21	13	15
Foxboro State Hospital, Foxboro	Ment	1,174	24	15	14
Gardner State Colony, Gardner	Ment	1,342	24	2	35
Danvers State Hospital, Hathorne	Ment	2,220	..	..	44
Medfield State Hospital, Medfield	Ment	1,850	50	..	75
Northampton State Hosp., Northampton	Ment	1,881	..	6	58
Grafton State Hospital, North Grafton	Ment	1,500	52	11	50
Taunton State Hospital, Taunton	Ment	1,545	50	5	49
Wesboro State Hospital, Westboro	Ment	1,594	66	5	14
Worcester State Hospital, Worcester	Ment	2,260	40	5	28
Hospital of the Norfolk State Prison Colony, Norfolk	Inst	75	27	20	12
County					
Barnstable County Sanat., Pocasset	TB Iso	48	28	177	41
City					
Fall River General Hosp., Fall River	G&TB	281	110	104	75
Board of Health Hospital, Brookline...	TB Iso	45	30	22	22
Lowell Tuberculosis Hospital, Lowell...	TB Iso	84	54	79	51
Health Department Hosp., Springfield.	TB Iso	112	46	70	40
Belmont Hospital, Worcester	TB Iso	275	150	199	104
Malden Contagious Hospital, Malden...	Iso	40	16	40	10
Somerville Contagious Hosp., Somerville	Iso	60	20	3	..
Long Island Hospital, Boston	Gen	467	..	4	3
Private					
New England Deaconess Hosp., Boston	Gen	285	11	54	8
Whidden Memorial Hospital, Everett...	Gen	95	..	2	1
Burbank Hospital, Fitchburg	Gen	189	36	32	19
North Adams Hospital, North Adams..	Gen	70	..	3	1
Waltham Hospital, Waltham	Gen	155	..	12	1
New England Peabody Home for Crippled Children, Newton	OrthTB	100	100	24	84
Shriners Hospital for Crippled Children, Springfield	Orth	60	..	18	8
Boston Lying-in Hospital, Boston	Mat	217	..	13	1
Totals		23,165	1,257	1,237	1,127
MICHIGAN					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Detroit	Gen	240	16	31	6
U.S.V.B.					
Veterans Admin. Facility, Camp Custer	Ment	835	20	2	..
State					
University Hospital, Ann Arbor	Gen	1,251	98	540	98
Ionia State Hospital, Ionia	Ment	831	..	..	..
Kalamazoo State Hospital, Kalamazoo.	Ment	2,760	..	..	93
Michigan Home and Training School, Lapeer	MeDe	3,825	..	20	32
Newberry State Hospital, Newberry	Ment	1,200	30	6	30
Pontiac State Hospital, Pontiac	Ment	1,766	36	..	..
Traverse City State Hospital, Traverse City	Ment	1,905	130	..	62
Ypsilanti State Hospital, Ypsilanti	Ment	1,485	..	..	14
Michigan State Prison Hosp., Jackson.	Inst	232	90	413	26
Michigan Farm Colony for Epileptics, Wahjamega	Epil	1,051	8	..	6
County					
Grand View Hospital, Ironwood	G&TB	112	60	36	44
Fairmount Hospital, Kalamazoo	TB Iso	151	75	76	52
Saginaw County Contagious Hospital, Saginaw	Iso	75	25	54	24
City					
Herman Kiefer Hosp., Detroit	GenTB Iso	1,335	761	1,357	741
Hurley Hospital, Flint	Gen	375	28	113	28
Highland Park General Hospital, Highland Park	Gen	156	13	5	4
Private					
Chenik Hospital, Detroit	G&TB	52	20	23	17
Grace Hospital, Detroit	Gen	390	..	119	2
Henry Ford Hospital, Detroit	Gen	560	68	127	58
Lincoln Hospital, Detroit	Gen	89	80	169	23
St. Mary's Hospital, Detroit	Gen	257	..	17	3
Blodgett Memorial Hosp., Grand Rapids	Gen	132	..	13	1
Shurly Eye, Ear, Nose and Throat Hospital, Detroit	ENT	133	58	58	25
Totals		21,198	1,616	3,179	1,389
MINNESOTA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Ft. Snelling.	G&TB	642	194	250	168
Veterans Admin. Facility, St. Cloud	Ment	746	24	1	24
U.S.I.A.					
Onigum General Hospital, Onigum	Gen	76	53	..	..
Pipestone Indian School Hospital, Pipestone	Gen	36	15	12	15
State					
University Hospitals, Minneapolis	Gen	420	4	80	6
Gillette State Hospital for Crippled Children, St. Paul	Orth	250	..	26	37
Minnesota Colony for Epileptics, Cambridge	MeDe	878	8	6	4
Minnesota School for Feebleminded, Faribault	MeDe	2,200	28	30	27
Fergus Falls State Hospital, Fergus Falls	Ment	1,800	70	20	65
Rochester State Hospital, Rochester	Ment	1,560	38	11	35
St. Peter State Hospital, St. Peter	Ment	2,037	94	99	93
Minnesota State Reformatory Hospital, St. Cloud	Inst	30	7	6	1
Minnesota State Prison Hospital, Stillwater	Inst	50	12	0	1
City-County					
Ancker Hospital, St. Paul	Gen	1,000	215	222	226
Private					
Fairview Hospital, Minneapolis	G&TB	200	30	101	3
St. Luke's Hospital, Duluth	Gen	237	25	105	17
St. Mary's Hospital, Duluth	Gen	260	28	98	16
Swedish Hospital, Minneapolis	Gen	271	..	25	1
St. Cloud Hospital, St. Cloud	Gen	181	..	47	2
Vocational Nursing Home, Minneapolis	Conv	50	..	2	1
Totals		12,924	845	1,141	742
MISSISSIPPI					
Federal—U.S.I.A.					
Choctaw-Mississippi Hosp., Philadelphia	Gen	28	4	6	2
State					
Mississippi State Hospital, Fondren	Ment	2,500	200	..	198
East Mississippi State Hosp., Meridian.	Ment	900	41	..	41
Totals		3,428	245	6	241
MISSOURI					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, St. Louis	Gen	100	10	10	7
U.S.V.B.					
Veterans Admin. Facility, Excelsior Springs	Gen	252	37	64	35
Veterans Admin. Facility, Jefferson Barracks	Gen	372	40	37	40
Dept. of Justice					
U. S. Hospital for Defective Delinquents, Springfield	Ment	705	..	75	60
State					
Missouri State Hospital No. 4, Farmington	Ment	1,160	40	..	21
State Hospital No. 1, Fulton	Ment	1,763	98	..	89
State Hospital No. 3, Nevada	Ment	1,704	60	..	20
State Hospital No. 2, St. Joseph	Ment	2,430	30	4	21
Missouri State Penitentiary Hospital, Jefferson City	Inst	70	..	19	40
City					
Sunnyslope Hospital, St. Joseph	TB Iso	27	9	12	..
City Isolation Hospital, St. Louis	TB Iso	250	67	131	67
Kansas City General Hospital, Kansas City	Gen	430	..	230	6
Kansas City General Hospital No. 2 (col.), Kansas City	Gen	250	18	500	19
St. Louis City Hospital, St. Louis	Gen	750	62	371	48
St. Louis City Hospital No. 2 (col.), St. Louis	Gen	300	40	258	38
City Sanitarium, St. Louis	Ment	3,460	36	8	36

	Type of Service	Total Capacity of Hospital	Tuberculosis Department: Beds	Tuberculosis Department: Patients Admitted	Tuberculosis Department: Patients Present
MISSOURI—Continued					
Private					
B. B. Putnam Memorial Hospital, Marceline	Gen	15	..	6	1
Barnes Hospital, St. Louis	Gen	270	..	140	22
Jewish Hospital, St. Louis	Gen	257	..	42	3
Missouri Odd Fellows Home Hospital, Liberty	Inst	85	6	6	4
Totals		14,650	553	1,913	577
MONTANA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Ft. Harrison	Gen	438	40	26	40
U.S.I.A.					
Blackfeet Hospital, Browning	Gen	30	6	41	5
Crow Indian Hospital, Crow Agency	Gen	..	24	8	3
Fort Belknap Indian Hospital and Sanitarium, Harlem	Gen	48	15	..	1
Tongue River Agency Hosp., Lame Deer	Gen	47	15	34	1
City-County					
Detention Hospital, Great Falls	TB Iso	35	10	12	3
Private					
Sidney Deaconess Hospital, Sidney	Gen	24	..	5	1
Totals		622	110	126	54
NEBRASKA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Lincoln	Gen	197	25	49	22
U.S.I.A.					
Winnebago Indian Hosp., Winnebago	Gen	58	15	60	10
State					
Nebraska State Penitentiary Hospital, Lincoln	Inst	22	6	4	0
County					
Douglas County Hospital, Omaha	Gen	400	90	93	82
City					
Lincoln General Hospital, Lincoln	Gen	145	8	6	3
Private					
St. Elizabeth's Hospital, Lincoln	Gen	175	..	15	2
St. Catherine of Sienna Hosp., McCook	Gen	60	..	2	2
Morrow and Clarke Hospital, Seward	Gen	20	3	..	..
Totals		1,077	147	229	121
NEVADA					
Federal—U.S.I.A.					
Carson Indian Hospital, Stewart	Gen	32	..	17	5
County					
Mineral County Hospital, Hawthorne	Gen	15	..	4	1
Washoe General Hospital, Reno	Gen	188	10	..	7
Lyon County Hospital, Yerington	Gen	16	8	3	2
Totals		251	18	24	15
NEW HAMPSHIRE					
Federal—U.S.N.					
U. S. Naval Hospital, Portsmouth	Gen	150	..	8	3
State					
New Hampshire State Hosp., Concord	Ment	1,950	20	..	14
Private					
Mary Hitchcock Memorial Hospital, Hanover	Gen	128	..	8	1
Totals		2,228	20	16	18
NEW JERSEY					
Federal—U.S.V.B.					
Veterans Admin. Facility, Lyons	Ment	895	27	7	26
State					
New Jersey State Hospital, Greystone Park	Men	4,520	131	48	144
New Jersey State Prison Hospital, Trenton	Inst	45	12	5	8
State Home for Girls, Trenton	Inst	50	..	9	9
New Jersey State Village for Epileptics, Skillman	Epil	1,357	18	..	18
County					
Essex County Hospital for Contagious Diseases, Belleville	Iso	550	30	..	10
"Bergen Pines" Bergen County Hospital, Ridgewood	TB Iso	380	225	292	230
Essex County Hospital, Cedar Grove	Ment	2,427	162	8	101
City					
Trenton Municipal Hospital, Trenton	Iso	404	108	58	77
Passaic Municipal Hospital, Passaic	Iso	25	4	3	..
Paterson City Hospital, Paterson	TB Iso	110	30	12	17
Irvington General Hospital, Irvington	Gen	79	..	12	1
Jersey City Hospital, Jersey City	Gen	900	75	395	86
Private					
Bayonne Hospital and Dispensary, Bayonne	Gen	170	..	55	6
Alexian Brothers Hospital, Elizabeth	Gen	165	..	16	1
St. Mary Hospital, Hoboken	Gen	430	8	57	2
Dr. E. C. Hazard Hosp., Long Branch	Gen	95	12	23	2
St. Peter's General Hosp., New Brunswick	Gen	164	38	37	38
St. Mary's Hospital, Orange	Gen	125	..	9	4
Children's Seashore House, Atlantic City	Orth	375	..	87	38
Totals		13,266	880	1,133	818
NEW MEXICO					
Federal—U.S.V.B.					
Veterans Admin. Facility, Albuquerque	G&TB	259	105	247	107
Veterans Admin. Facility, Ft. Bayard	G&TB	450	321	144	109
U.S.I.A.					
U. S. Indian School Hosp., Albuquerque	Gen	74	..	28	0
Zuni Sanatorium, Black Rock	Gen	15	..	..	..

	Type of Service	Total Capacity of Hospital	Tuberculosis Department: Beds	Tuberculosis Department: Patients Admitted	Tuberculosis Department: Patients Present
NEW MEXICO—Continued					
Eastern Navajo Agency Hospital, Crownpoint	Gen	24	..	33	3
Jicarilla Agency Hospital, Dulce	Gen	19	8	13	1
Mescalero Indian Hospital, Mescalero	Gen	31	12	8	1
Northern Navajo Hospital, Shiprock	Gen	44	..	60	1
Private					
St. Joseph Sanatorium and Hospital, Albuquerque	G&TB	196	96	84	49
Southwestern Presbyterian Sanatorium, Albuquerque	G&TB	130	80	125	55
St. Anthony's Sanitarium and Hospital, Las Vegas	G&TB	46	25	7	8
St. Vincent's Sanatorium and Hospital, Santa Fe	G&TB	85	20	14	4
St. Joseph Hospital, Clayton	Gen	25	..	12	4
Rehoboth Mission Hospital, Rehoboth	Gen	30	..	15	2
A. T. & S. F. Hospital, Albuquerque	Indus	67	16	49	15
A. T. & S. F. Hospital, Clovis	Indus	32	..	5	2
Totals		1,527	683	844	361
NEW YORK					
Federal—U.S.A.					
Station Hospital, Ft. Slocum	Gen	155	..	3	1
U.S.N.					
U. S. Naval Hospital, Brooklyn	Gen	848	27	12	6
U.S.P.H.S.					
U. S. Marine Hospital, Buffalo	Gen	75	4	16	1
U. S. Marine Hospital, New York City	Gen	540	130	48	135
U.S.V.B.					
Veterans Admin. Facility, Batavia	Gen	297	..	20	8
Veterans Admin. Facility, New York City	Gen	950	62	158	59
Veterans Admin. Facility, Northport	Ment	1,392	40	3	37
State					
New York State Reconstruction Home, West Haverstraw	Orth	310	..	..	..
Matteawan State Hospital, Beacon	Ment	1,275	..	3	23
Binghamton State Hosp., Binghamton	Ment	2,974	100	8	94
Buffalo State Hospital, Buffalo	Ment	2,764	40	7	34
Central Islip State Hosp., Central Islip	Ment	7,240	100	27	117
Dannemora State Hospital, Dannemora	Ment	965	..	..	42
Gowanda State Homeopathic Hospital, Helmuth	Ment	1,303	60	6	35
Kings Park State Hosp., Kings Park	Ment	4,651	166	87	217
Marcy State Hospital, Marcy	Ment	2,683	150	..	142
Middletown State Homeopathic Hospital, Middletown	Ment	3,097	100	..	..
Institution for Male Defective Delinquents, Napanoch	MeDe	965	4	4	4
Newark State School, Newark	MeDe	1,822	8	4	28
Manhattan State Hosp., New York City	Ment	3,433	134	53	117
St. Lawrence State Hosp., Ogdensburg	Ment	2,317	104	..	122
Rockland State Hospital, Orangeburg	Ment	3,750	..	28	19
Hudson River State Hospital, Poughkeepsie	Ment	4,378	168	38	211
Rochester State Hospital, Rochester	Ment	2,168	75	..	65
Rome State School, Rome	MeDe	2,767	120	87	94
Syracuse Psychopathic Hosp., Syracuse	Ment	60	..	4	1
Syracuse State School, Syracuse	MeDe	1,085	..	1	1
Letchworth Village, Thiells	MeDe	2,850	8	..	8
Utica State Hospital, Utica	Ment	1,640	..	1	27
Willard State Hospital, Willard	Ment	2,692	81	..	76
Harlem Valley State Hosp., Wingdale	Ment	3,972	154	100	104
Auburn State Prison Hosp., Auburn	Inst	50	8	2	0
Clinton Prison General and Tuberculosis Hospital, Dannemora	Inst	235	162	15	46
Sing Sing Prison Hospital, Ossining	Inst	100	..	24	1
Craig Colony, Sonyea	Epil	2,129	100	..	..
County					
Oneida County Hospital, Rome	Gen	213	..	23	5
Grasslands Hospital, Valhalla	Gen	888	333	456	316
Onondaga County Hosp., Onondaga	GenAged	154	..	7	3
Rensselaer County Hospital, Troy	Chronic	68	..	2	2
City-County					
Buffalo City Hospital, Buffalo	Gen	1,025	324	484	311
City					
Kingston Avenue Hospital, Brooklyn	Iso	410	72	165	71
Riverside Hospital, New York City	TB Iso	332	284	679	338
Willard Parker Hosp., New York City	TB Iso	424	134	665	108
Binghamton City Hosp., Binghamton	Gen	460	..	45	3
Cumberland Hospital, Brooklyn	Gen	284	..	118	8
Kings County Hospital, Brooklyn	Gen	3,120	200	1,457	198
Bellevue Hospital, New York City	Gen	2,313	174	3,394	204
Harlem Hospital, New York City	Gen	273	..	549	20
Metropolitan Hospital, New York City	Gen	1,562	308	1,229	447
Morrisania City Hosp., New York City	Gen	471	..	339	3
Utica General Hospital, Utica	Gen	127	..	13	1
New York City Children's Hospital, New York City	MeDe	808	..	116	0
Harts Island Prison Hospital, New York City	Inst	59	31	94	27
Bellevue Settlement House, New York City	ConvTB	22	22	43	21
Private					
Metropolitan Life Insurance Company Sanatorium, Mt. McGregor	G&TB	360	254	73	137
Albany Hospital, Albany	Gen	545	120	147	136
Auburn City Hospital, Auburn	Gen	133	..	3	..
Beth-El Hospital, Brooklyn	Gen	190	..	12	1
St. John's Hospital, Brooklyn	Gen	204	..	24	18
Trinity Hospital, Brooklyn	Gen	110	..	12	1
Buffalo General Hospital, Buffalo	Gen	439	..	133	4

	Type of Service	Total Capacity of Hospital	Tuberculosis Department		
			Beds	Patients Admitted	Patients Present
NEW YORK—Continued					
Millard Fillmore Hospital, Buffalo	Gen	236	..	26	1
Charles S. Wilson Memorial Hospital, Johnson City	Gen	194	..	29	2
Lenox Hill Hospital, New York City	Gen	514	44	143	44
Manhattan General Hospital, New York City	Gen	138	17	74	3
Mount Sinai Hospital, New York City	Gen	780	8	..	..
St. Francis' Hospital, New York City	Gen	425	..	38	2
Nyack Hospital, Nyack	Gen	88	..	4	2
Northern Dutchess Health Service Center, Rhinebeck	Gen	30	4	2	0
Genesee Hospital, Rochester	Gen	193	..	19	2
Rome Infirmary, Rome	Gen	50	10	1	0
Sailors' Snug Harbor Hospital, Staten Island	Gen	200	12	1	2
Natalie and Louis Heinsheimer Memorial, Far Rockaway	Orth	60	60	112	..
Blythedale Hospital and Home for Crippled Children, Valhalla	Orth	73	..	..	..
New York Orthopaedic Dispensary and Hospital, White Plains	Orth	169	..	..	..
Montefiore Hospital for Chronic Diseases, New York City	Chronic	711	164	364	165
Totals		86,787	4,680	11,854	4,481
NORTH CAROLINA					
Federal—U.S.A.					
Station Hospital, Ft. Bragg	Gen	83	..	5	1
State					
North Carolina Orthopedic Hospital, Gastonia	Orth	150	50	..	..
State Hospital (col.), Goldsboro	Ment	1,919	75	..	40
State Hospital, Raleigh	Ment	2,275	35	3	24
County					
Gaston County Colored Hospital, Gastonia	Gen	11	7	2	1
Wake County Home Hosp., Raleigh	Inst	115	6	2	2
Private					
Jubilee Hospital (col.), Henderson	Gen	33	..	10	2
Martin Memorial Hospital, Mt. Airy	Gen	44	..	..	1
Atlantic Coast Line Hospital, Rocky Mount	Indus	50	..	7	1
Totals		4,680	173	29	72
NORTH DAKOTA					
Federal—U.S.I.A.					
Turtle Mountain Hospital, Belcourt	G&TB	52	14	49	7
Fort Totten Hospital, Fort Totten	Gen	31	4	22	2
State					
Grafton State School, Grafton	MeDe	784	10	..	7
North Dakota State Hospital for Insane, Jamestown	Ment	2,000	35	3	10
North Dakota State Penitentiary Hospital, Bismarck	Inst	35	10	3	0
Private					
St. Joseph's Hospital, Minot	Gen	86	3	15	1
Wahpeton Hospital, Wahpeton	Gen	23	..	2	1
Mercy Hospital, Williston	Gen	75	..	6	2
Totals		3,086	76	100	30
OHIO					
Federal—U.S.P.H.S.					
U. S. Marine Hospital, Cleveland	Gen	251	23	45	12
U.S.V.B.					
Veterans Admin. Facility, Dayton	Gen	1,104	250	532	176
Veterans Admin. Facility, Chillicothe	Ment	944	..	3	26
State					
Athens State Hospital, Athens	Ment	1,641	153	..	78
Longview State Hospital, Cincinnati	Ment	2,353	30	5	64
Columbus State Hospital, Columbus	Ment	2,856	60	..	60
Dayton State Hospital, Dayton	Ment	1,589	69	9	82
Lima State Hospital, Lima	Ment	1,133	43	..	29
Massillon State Hospital, Massillon	Ment	2,885	88	8	41
Institution for Feebleminded, Orient	MeDe	2,600	..	28	28
Toledo State Hospital, Toledo	Ment	2,532	40	..	32
Ohio Penitentiary Hospital, Columbus	Inst	132	31	180	31
Girls' Industrial School Hosp., Delaware	Inst	32	8	11	2
Ohio State Reformatory, Mansfield	Inst	91	10	31	6
Ohio Soldiers and Sailors Home Hospital, State Soldiers Home	Inst	200	..	3	1
Ohio Hospital for Epileptics, Gallipolis	Epil	1,917	36	..	..
County					
Butler County Home, Hamilton	Inst	170	20	23	5
City					
City Hospital, Akron	Gen	312	..	68	1
Cincinnati General Hospital, Cincinnati	Gen	860	..	311	20
City Hospital, Cleveland	Gen	1,640	354	576	354
Private					
Bethesda Hospital, Cincinnati	Gen	199	..	21	1
Good Samaritan Hospital, Cincinnati	Gen	463	6	60	5
Charity Hospital, Cleveland	Gen	301	14	75	14
Evangelical Deaconess Hosp., Cleveland	Gen	109	24	45	13
Fairview Park Hospital, Cleveland	Gen	95	11	15	11
Glenville Hospital, Cleveland	Gen	88	..	4	1
Polyclinic Hospital, Cleveland	Gen	90	28	..	20
St. Alexis Hospital, Cleveland	Gen	220	23	39	19
St. Anthony's Hospital, Columbus	Gen	220	8	14	6
White Cross Hospital, Columbus	Gen	245	16	28	2
St. Elizabeth Hospital, Dayton	Gen	385	20	84	20
Toledo Hospital, Toledo	Gen	250	24	29	6
St. Elizabeth's Hospital, Youngstown	Gen	246	7	8	4
OHIO—Continued					
St. Luke's Convalescent Hospital for Children, Cleveland	Orth	62	..	..	4
Children's Convalescent Home, Cincinnati	Conv	100	..	9	6
Totals		28,315	1,396	2,264	1,180
OKLAHOMA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Muskogee	Gen	447	61	181	54
U.S.I.A.					
Kiowa Indian Hospital, Lawton	Gen	101	12	113	7
Pawnee-Ponca Hospital, Pawnee	Gen	47	12	30	4
State					
Central Oklahoma State Hospital, Norman	Ment	2,500	30	..	..
Western Oklahoma Hospital, Supply	Ment	1,275	20	5	15
Eastern Oklahoma Hospital, Vinita	Ment	2,365	50	35	37
Oklahoma State Prison Hospital, McAlester	Inst	50	..	21	4
City					
Okmulgee City Hospital, Okmulgee	Gen	75	..	2	2
Private					
Masonic Hospital, Cherokee	Gen	50	..	2	1
Oklahoma Baptist Hospital, Muskogee	Gen	85	..	7	1
Great Western Hospital (col.), Oklahoma City	Gen	21	3	2	2
Oklahoma City General Hospital, Oklahoma City	Gen	100	..	29	2
Ponca City Hospital, Ponca City	Gen	50	..	3	1
Morningside Hospital, Tulsa	Gen	225	..	29	1
Totals		7,391	188	459	131
OREGON					
Federal—U.S.V.B.					
Veterans Admin. Facility, Portland	Gen	385	32	48	28
U.S.I.A.					
Klamath Indian Hosp., Klamath Agency	Gen	23	2	6	1
State					
Oregon State Hospital, Salem	Ment	2,300	..	6	65
Oregon Fairview Home, Salem	MeDe	915	15	4	10
County					
Multnomah Hospital, Portland	Gen	300	40	60	30
Private					
Columbia Hospital, Astoria	Gen	91	..	2	1
Holy Rosary Hospital, Ontario	Gen	35	..	6	1
Morningside Hospital, Portland	Ment	306	20	..	24
Totals		4,355	109	132	169
PENNSYLVANIA					
Federal—U.S.N.					
U. S. Naval Hospital, Philadelphia	Gen	540	..	55	5
U.S.P.H.S.					
U. S. Public Health Service Hospital, Lewisburg	Gen	100	12	52	4
U. S. Marine Hospital, Pittsburgh	Gen	73	..	8	2
U.S.V.B.					
Veterans Admin. Facility, Aspinwall	G&TB	501	181	370	177
Veterans Admin. Facility, Coatesville	Ment	1,136	42	26	11
State					
Hospital of the University of Pennsylvania, Philadelphia	Gen	562	..	37	2
Philipsburg State Hospital, Philipsburg	Gen	100	..	10	1
Hospital for Crippled Children, Elizabethtown	Orth	125	..	..	..
Allentown State Hospital, Allentown	Ment	1,510	95	29	95
Danville State Hospital, Danville	Ment	1,947	88	..	43
Harrisburg State Hospital, Harrisburg	Ment	1,883	..	..	132
Laureiton State Village, Laureiton	MeDe	656	9	2	8
Norristown State Hospital, Norristown	Ment	3,420	150	..	..
Pennhurst State School, Pennhurst	MeDe	1,663	30	..	10
Polk State School, Polk	MeDe	3,000	16	35	6
Torrance State Hospital, Torrance	Ment	1,497	22	..	..
Farview State Hospital, Waymart	Ment	708	24	..	20
Wernersville State Hosp., Wernersville	Ment	1,400	80	13	76
Eastern State Penitentiary Hospital, Philadelphia	Ihst	81	..	6	8
Western Penitentiary Hosp., Pittsburgh	Inst	25	8	6	4
County					
Retreat Mental Hospital, Retreat	N&M	1,000	40	..	20
Schuylkill County Hospital for Mental Diseases, Schuylkill Haven	Ment	485	..	..	9
Allegheny County Home and Hospital for the Insane, Woodville	Ment	2,536	309	357	258
Erie County Home, Tuberculosis Annex, Girard	InstTB	32	32	45	30
Retreat Home and Hospital for Chronic Diseases, Retreat	Inst	130	25	..	20
Schuylkill County Almshouse Hospital, Schuylkill Haven	Inst	165	8	..	..
City-County					
Philadelphia County Prison Hospital (Holmesburg), Philadelphia	Inst	50	14	14	6
City					
Municipal Hospital, Johnstown	Iso	60	12	4	0
Philadelphia General Hosp., Philadelphia	Gen	2,500	465	1,629	312
Pittsburgh City Home and Hospitals, Mayview	G-N&M	896	133	139	143
Private					
Abington Memorial Hosp., Abington	Gen	242	..	45	2
Coatesville Hospital, Coatesville	Gen	97	2	5	0
Fitzgerald-Mercy Hospital, Darby	Gen	200	10	15	1
Easton Hospital, Easton	Gen	199	..	22	2
Latrobe Hospital, Latrobe	Gen	65	..	6	1

	Type of Service	Total Capacity of Hospital	Tuberculosis Department: Beds	Tuberculosis Department: Patients Admitted	Tuberculosis Department: Patients Present
PENNSYLVANIA—Continued					
Henry Clay Frick Memorial Hospital, Mt. Pleasant	Gen	60	..	2	1
Frederick Douglass Memorial Hospital (col.), Philadelphia	Gen	61	15	49	15
Germantown Dispensary and Hospital, Philadelphia	Gen	310	..	67	15
Hahnemann Hospital, Philadelphia	Gen	515	..	40	1
Hospital of the Protestant Episcopal Church, Philadelphia	Gen	485	6	17	3
Hospital of the Woman's Medical College of Pennsylvania, Philadelphia	Gen	146	..	40	0
Jefferson Medical College Hospital, Philadelphia	Gen	631	40	153	40
Mercy Hospital (col.), Philadelphia	Gen	100	..	43	4
Presbyterian Hospital, Philadelphia	Gen	383	..	36	1
Temple University Hosp., Philadelphia	Gen	390	4	..	4
Allegheny General Hosp., Pittsburgh	Gen	379	..	81	7
Mercy Hospital, Pittsburgh	Gen	622	..	102	5
St. Francis Hospital, Pittsburgh	Gen	500	..	38	1
Elk County General Hosp., Ridgway	Gen	60	..	2	1
Robert Packer Hospital, Sayre	Gen	231	..	18	1
Washington Hospital, Washington	Gen	138	..	35	1
Windber Hospital, Windber	Gen	107	..	16	3
Dixmont Hospital, Dixmont	N&M	1,000	72	..	71
Elwyn Training School, Elwyn	MeDe	1,045	60	..	..
St. Barnabas Free Home, Gibsonia	Inc	100	..	..	4
Children's Hospital, Philadelphia	Chil	130	..	17	11
Totals		36,977	2,604	3,686	1,597
RHODE ISLAND					
Federal—U.S.N.					
U. S. Naval Hospital, Newport	Gen	227	..	3	3
State					
State Infirmary, Howard	Gen	1,004	..	10	7
State Hospital for Mental Diseases, Howard	Ment	2,301	..	..	85
Rhode Island State Prison Hospital, Howard	Inst	24	..	3	2
City					
Charles V. Chapin Hosp., Providence	TB Iso	265	60	150	53
Private					
Newport Hospital, Newport	Gen	150	..	25	4
Totals		3,971	60	191	154
SOUTH CAROLINA					
State					
South Carolina State Hosp., Columbia	Ment	3,454	..	..	81
County					
Spartanburg General Hospital, Spartanburg	Gen	256	98	48	31
Private					
Berkeley County Hosp., Moncks Corner	G&TB	51	22	36	13
Roper Hospital, Charleston	Gen	295	16	103	14
St. Francis Xavier Infirmary, Charleston	Gen	50	..	4	2
South Carolina Baptist Hospital, Columbia	Gen	95	..	11	2
Totals		4,201	136	202	143
SOUTH DAKOTA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Hot Springs	Gen	230	90	103	46
U.S.I.A.					
Cheyenne River Indian Hospital, Cheyenne Agency	Gen	40	..	28	3
Marcoe Indian Hospital, Ft. Thompson	Gen	14	..	30	1
Pine Ridge Hospital, Pine Ridge	Gen	58	15	81	11
Totals		342	105	242	61
TENNESSEE					
Federal—U.S.V.B.					
Veterans Admin. Facility, Johnson City	Gen	565	27	..	20
Veterans Admin. Facility, Memphis	Gen	450	44	111	31
State					
Western State Hospital, Bolivar	Ment	1,800	40	35	40
Eastern State Hospital, Knoxville	Ment	1,445	135	..	106
Central State Hospital, Nashville	Ment	1,700	54	..	40
Tennessee State Prison Hosp., Nashville	Inst	128	90	27	25
Private					
"Uplands" Cumberland Mountain Sanatorium, Pleasant Hill	G&TB	20	6	16	3
Geo. W. Hubbard Hospital of Meharry Medical College (col.), Nashville	Gen	147	2	..	1
Wiggins Clinic, Paris	Gen	12	..	2	1
Junior League Home for Crippled Children, Nashville	Orth	36	..	6	5
Totals		6,303	398	197	272
TEXAS					
Federal—U.S.A.					
William Beaumont General Hospital, El Paso	Gen	512	46	26	8
Station Hospital, Laredo	Gen	25	4	0	0
U.S.P.H.S.					
U. S. Marine Hospital, Galveston	Gen	192	40	49	22
U.S.V.B.					
Veterans Admin. Facility, Legion	G&TB	433	433	397	244
Veterans Admin. Facility, Waco	Ment	334	..	..	5
State					
Austin State School, Austin	MeDe	1,140	..	9	8
Rusk State Hospital, Rusk	Ment	1,987	..	19	57
San Antonio State Hosp., San Antonio	Ment	2,321	137	..	126
Terrell State Hospital, Terrell	Ment	2,299	15	1	20
Wichita Falls State Hospital, Wichita Falls	Ment	2,050	50	18	44
Texas State Prison Hosp., Huntsville	Inst	42	4	36	2
Abilene State Hospital, Abilene	Epil	1,082	30	..	20
County					
Northwest Texas Hospital, Amarillo	Gen	70	9	17	8
Kleberg County Hospital, Kingsville	Gen	50	3	..	1
Bexar County Home for the Aged and Bexar County Tuberculosis Colony, Southton	InstTB	72	72	93	71
City-County					
El Paso City-County Hospital, El Paso	Gen	150	31	110	17
Jefferson Davis Hospital, Houston	Gen	185	..	132	2
City					
John Sealy Hospital, Galveston	Gen	350	16	..	14
Private					
Baylor University Hospital, Dallas	Gen	300	..	26	1
Denison City Hospital, Denison	Gen	25	4	12	0
Hotel Dieu, Sisters Hospital, El Paso	Gen	100	..	16	5
All Saints Episcopal Hosp., Ft. Worth	Gen	85	..	4	2
St. Mary's Infirmary, Galveston	Gen	150	..	..	4
Santa Rosa Hospital, San Antonio	Gen	342	..	23	2
Wichita Falls Clinic-Hospital, Wichita Falls	Gen	72	..	6	1
Totals		14,368	894	994	684
UTAH					
Federal—U.S.V.B.					
Veterans Admin. Facility, Salt Lake City	Gen	103	..	26	2
U.S.I.A.					
Uintah and Ouray Agency Indian Hospital, Ft. Duchesne	Gen	18	..	8	1
County					
Salt Lake General Hospital, Salt Lake City	Gen	225	32	44	31
Private					
Park City Miners' Hosp., Park City	Gen	50	6	10	1
St. Mark's Hospital, Salt Lake City	Gen	123	16	38	15
Totals		519	54	126	50
VERMONT					
Private					
Mary Fletcher Hospital, Burlington	Gen	135	..	27	1
Totals		135	..	27	1
VIRGINIA					
Federal—U.S.N.					
Norfolk Naval Hospital, Portsmouth	Gen	613	..	17	15
U.S.P.H.S.					
U. S. Marine Hospital, Norfolk	Gen	300	20	36	12
U.S.V.B.					
Veterans Admin. Facility, Veterans Administration Home	Gen	810	..	16	2
State					
State Colony for Epileptics and Feebleminded, Colony	MeDe	1,000	..	..	29
Central State Hosp. (col.), Petersburg	Ment	3,031	90	20	75
Western State Hospital, Staunton	Ment	2,500	100	10	60
Eastern State Hospital, Williamsburg	Ment	1,544	..	120	..
State Farm Hospital, State Farm	Inst	100	40	28	20
City					
City Home, Richmond	G&Inst	525	52	57	13
Private					
Alexandria Hospital, Alexandria	Gen	60	..	3	1
Totals		10,483	302	307	227
WASHINGTON					
Federal—U.S.A.					
Station Hospital, Ft. Lewis	Gen	150	..	5	1
U.S.N.					
U. S. Naval Hospital, Bremerton	Gen	311	..	13	4
U.S.P.H.S.					
U. S. Marine Hospital, Seattle	Gen	300	45	64	45
U. S. Penitentiary Hosp., Steilacoom	Inst	72	16	18	5
U.S.V.B.					
Veterans Admin. Facility, Walla Walla	G&TB	400	168	133	100
Veterans Admin. Facility, American Lake	Ment	676	6	..	5
U.S.I.A.					
Tacoma Hospital, Tacoma	G&TB	268	268	303	227
State					
Eastern State Hospital, Medical Lake	Ment	1,582	..	1	2
Northern State Hosp., Sedro Woolley	Ment	1,655	27	5	27
County					
King County Hospital, Unit No. 1 (Harborview), Seattle	Gen	394	..	..	5
City-County					
Firland Sanatorium and Isolation Hospital, Richmond Highlands	TB Iso	250	250	83	223
Private					
Aberdeen General Hospital, Aberdeen	Gen	50	..	11	2
St. Francis Hospital, Bellingham	Gen	17	..	2	0
St. Luke's General Hospital, Bellingham	Gen	75	..	6	1
Seattle General Hospital, Seattle	Gen	100	..	10	1
Memorial Hospital, Sedro Woolley	Gen	35	..	5	..
Tacoma General Hospital, Tacoma	Gen	220	..	17	2
St. Anthony's Hospital, Wenatchee	Gen	65	..	10	2
Shriners Hospital for Crippled Children, Spokane	Orth	20	..	5	1
Totals		6,640	780	691	653

	Type of Service	Total Capacity of Hospital	Tuberculosis Department: Beds	Tuberculosis Department: Patients Admitted	Tuberculosis Department: Patients Present
WEST VIRGINIA					
Federal—U.S.V.B.					
Veterans Admin. Facility, Huntington	Gen	210	18	70	13
State					
Huntington State Hospital, Huntington	Ment	945	..	..	30
Lakin State Hospital (col.), Lakin	Ment	500	15	..	5
Spencer State Hospital, Spencer	Ment	926	..	..	8
West Virginia Penitentiary Hospital, Moundsville	Inst	...	40	48	28
Private					
Brown's Hospital (col.), Bluefield	Gen	40	..	7	0
Davis Memorial Hospital, Elkins	Gen	80	4	8	0
Totals		2,701	77	133	84
WISCONSIN					
Federal—U.S.V.B.					
Veterans Admin. Facility, Milwaukee	G&TB	1,304	254	197	134
U.S.I.A.					
Hayward Indian Hospital, Hayward	Gen	49	15	68	15
Keshena Indian Hospital, Keshena	Gen	60	10	29	2
Tomah Indian Hospital, Tomah	Gen	42	12	24	5
State					
State of Wisconsin General Hospital, Madison	Gen	630	12	..	..
Northern Wisconsin Colony and Training School, Chippewa Falls	MeDe	1,499	..	..	6
Wisconsin State Hospital for Insane, Mendota	Ment	867	..	5	2
Northern Hospital for Insane, Winnebago	Ment	888	7	3	8
Wisconsin State Prison Hosp., Waupun	Inst	20	5	4	3
County					
Milwaukee County General Hospital, Wauwatosa	Gen	1,050	..	233	20
WISCONSIN—Continued					
Outagamie County Asylum for Chronic Insane, Appleton	Ment	190	..	..	..
Fond du Lac County Insane Asylum, Fond du Lac	Ment	268	..	..	12
Douglas County Asylum, Home and Sanatorium, Itasca	Ment	240	28	5	27
Racine County Asylum, Racine	Ment	256	..	6	1
Milwaukee Asylum for Chronic Insane, Wauwatosa	Ment	1,429	15	6	16
Private					
St. Agnes Hospital, Fond du Lac	Gen	225	..	7	2
Grandview Hospital, La Crosse	Gen	106	10	12	..
St. Francis Hospital, La Crosse	Gen	275	24	48	4
St. Joseph's Hospital, Milwaukee	Gen	325	..	25	2
St. Mary's Hospital, Wausau	Gen	130	..	12	1
Totals		9,853	392	684	260
WYOMING					
Federal—U.S.V.B.					
Veterans Admin. Facility, Sheridan	Ment	466	15	..	6
U.S.I.A.					
Shoshone Indian Hosp., Fort Washakie	Gen	35	17	23	..
State					
Wyoming State Hospital, Evanston	Ment	519	..	2	3
Private					
Wheatland General Hospital, Wheatland	Gen	40	..	3	1
Totals		1,060	32	28	10
Totals (all states)		503,845	28,534	47,007	24,288

PREVENTORIUMS (Sanatorium units for children not included.)

		Bed Capacity	Patients Admitted	Patients Present	Daily Average
ARIZONA					
Tucson Preventorium	Tucson	10	..	6	..
CALIFORNIA					
Chas. S. Howard Foundation	Belmont	20	20	..	16
Kern County Preventorium	Keene	44	65	42	44
Del Valle Preventorium	Livermore	85	193	..	81
Canyon Preventorium	Monrovia	90	271	..	90
El Nido, Pasadena Preventorium	Pasadena	40	53	..	40
Rest Haven Preventorium	San Diego	64	82	50	57
Sunnyholme Preventorium	San Jose	47	70	34	38
San Mateo Preventorium	San Mateo	28	22	..	24
DELAWARE					
Sunnybrook Cottage	Marshallton	22	35	..	20
FLORIDA					
Hope Haven	Jacksonville	21	122	..	19
Pine Heath Preventorium	Tampa	25	398	..	25
GEORGIA					
Kiwanis Sunshine Preventorium	Savannah	13	28	13	13
ILLINOIS					
Ridge Farm Preventorium	Deerfield	24	..	..	..
MASSACHUSETTS					
Prendergast Preventorium	Boston	30	195	27	29
MICHIGAN					
American Legion Children's Billet	Otter Lake	20	..	20	..
MINNESOTA					
Children's Preventorium of Ramsey County	St. Paul	80	31	82	78
MISSOURI					
Night and Day Rest Camp	St. Louis	85	150	..	50
NEW JERSEY					
Tuberculosis Preventorium for Children	Farmingdale	247	620	190	175
NEW YORK					
Van Rensselaer Preventorium	Albany	50	..	..	..
Ontario County Preventorium	Canandaigua	20	..	12	..
Chemung County Preventorium	Elmira	22	46	22	21
St. Agatha Preventorium	Nanuet	100	800	..	..
OHIO					
Children's Fresh Air Camp and Hospital	Cleveland	60	200	..	60
PENNSYLVANIA					
River Crest Preventorium	Mont Clare	100	234	70	80
RHODE ISLAND					
Lakeside Home and Mary Murray Preventorium	Hoxsie	50	251	31	47
TENNESSEE					
Cheerfield Farm Preventorium	Raleigh	50	32	50	..
VERMONT					
Caverly Preventorium	Pittsford	44	83	44	44
WISCONSIN					
Blue Mound Preventorium	Wauwatosa	116	97	92	..
Totals		1,667	4,098	785	1,051

INDEX FOR THE TUBERCULOSIS DATA

Admissions 1860, 1861, 1865, 1866, 1869
Capacity of tuberculosis institutions by state and by control 1859, 1860
Census of patients 1862, 1864
Census of patients on day of reporting 1863, 1865
Children, hospitalization of 1866
Children, sanatoriums for 1870
City-county sanatoriums 1886
Control 1856, 1860, 1882–1887
Costs, annual maintenance of tuberculosis institutions 1879, 1880
Costs, daily per capita of tuberculosis institutions 1879, 1881
Costs of tuberculosis hospitalization 1879–1882, 1891
County sanatoriums 1884, 1885
Dental service 1871, 1872
Discharge, condition of patients on 1865, 1867
Discharged patients 1861, 1863
Distribution, number and size of tuberculosis institutions 1856, 1857, 1858
Educational activities 1873–1877
Educational facilities for patients 1876
Federal tuberculosis departments and sanatoriums 1882, 1883
General hospitals, tuberculosis departments of 1887-1889, 1891
Health service for employes 1869
Income, sources of 1881, 1882
Industrial rehabilitation, facilities for 1876
Isolation facilities for tuberculosis 1858, 1888
Laboratory tests and examinations 1872, 1873
Length of stay 1863, 1864
Library facilities 1877
Medical facilities 1870-1873, 1891
Medical service 1869
Men, sanatoriums for 1870
Method of survey 1855
Municipal sanatoriums 1885, 1886
Necropsies 1873
Negroes, sanatoriums for 1870
Nurses, training of in tuberculosis 1875
Patients, training of 1876
Patients treated during twelve months period 1861, 1862
Paying status of patients 1882
Personnel, nonmedical 1868
Personnel of civilian sanatoriums 1869
Physicians, number of, in tuberculosis sanatoriums 1868, 1891
Pneumothorax 1870
Population, patient 1860–1866
Preventoriums, list of 1915
Preventorium service 1891
Private sanatoriums by states 1887
Purpose of survey 1855
Records, medical 1877, 1879
Rehabilitation 1876, 1891
Research 1877
Residencies in tuberculosis 1874
Roentgen examinations 1872
Scope of survey 1855
Size of tuberculosis institutions 1856, 1858
State sanatoriums 1883, 1884
Summary by states 1892–1899
Surgical facilities 1871
Therapeutic procedures 1871
Tuberculosis departments of hospitals according to type of service 1890
Tuberculosis departments of hospitals, list of 1909–1915
Tuberculosis-isolation hospitals 1887, 1888
Tuberculosis hospitals and sanatoriums, list of 1899–1908
Valuation of sanatoriums according to size and control 1878
Valuation, replacement of tuberculosis institutions 1878, 1879
Women, sanatoriums for 1870
X-ray facilities 1872

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

535 NORTH DEARBORN STREET - - - CHICAGO, ILL.

Cable Address - - - - "Medic, Chicago"

Subscription price - - - - - Seven dollars per annum in advance

Please send in promptly notice of change of address, giving both old and new; always state whether the change is temporary or permanent. Such notice should mention all journals received from this office. Important information regarding contributions will be found on second advertising page following reading matter.

SATURDAY, DECEMBER 7, 1935

THE TUBERCULOSIS SURVEY

In this issue, THE JOURNAL presents a unique report of a survey of tuberculosis hospitals, sanatoriums, tuberculosis departments and preventoriums, which provides the most complete data yet obtained on the hospitalization of tuberculous patients in the United States. The report is a compilation of facts which lend themselves to comparative studies.

The purpose of the survey made by the Council on Medical Education and Hospitals was to give the medical profession a comprehensive picture of tuberculosis hospitalization in this country. The report will also assist in the registration of hospitals and sanatoriums and in their recognition for purposes of training physicians and nurses. It covers 471 tuberculosis hospitals and sanatoriums, 740 tuberculosis departments of hospitals and twenty-nine institutions classified as preventoriums, a total of 1,240 institutions.

The great number of classified facts presented in these pages was made possible by the cooperation of many persons and agencies, including the officers of the American Sanatorium Association and the National Tuberculosis Association, who assisted in the preparation of questionnaires and the direction of the survey, and the officers of the institutions, 98.9 per cent of whom filled out and returned the questionnaire and who responded cordially to each of the 656 visits of inspection by the hospital examiners on the staff of the Council on Medical Education and Hospitals. Nearly all state departments of health and state tuberculosis associations contributed data from their offices not available elsewhere.

The survey shows that 95,198 beds are available for tuberculous patients throughout the states and there is an average of 69,024 patients. Construction planned or in progress will add another 6,661 beds.

The figures given were obtained within the calendar year 1934 and are for the twelve months preceding the date of the questionnaire. During that time 97,381 patients were discharged, including those who died. Reports of state departments of health and estimates based on the United States Census indicate that the total deaths, institutional and otherwise, from all forms of tuberculosis in the year 1933 were 74,564. Among those treated for tuberculosis in institutions, 67,021 were adults. Of these cases 7.5 per cent were reported as "arrested," 9.8 per cent as "apparently arrested," 11.6 per cent as "quiescent," 30 per cent "improved," 17.2 per cent "unimproved," and 23.9 per cent of the patients died.

The ratio of physicians to patients is 1:28 in the Veterans tuberculosis hospitals, 1:52 in the Indian sanatoriums and 1:36 in the tuberculosis hospital operated by the U. S. Public Health Service, 1:62 in the state institutions, 1:51 in the county, 1:70 in the municipal, 1:60 in the city and county, and 1:32 in the private sanatoriums.

The total cost of all the facilities provided for tuberculosis in all institutions including the value of land, buildings and equipment and figured on the basis of replacement is around $330,000,000. The average cost of these facilities in veterans' hospitals was $4,000 per bed.

In most of the other institutions, both private and public, the cost per bed was less, but there are extremes in variation. In several instances, because of elaborate plans and expensive equipment, the cost of existing institutions has been as high as $10,000 per bed, and one sanatorium built with public money cost $13,043 per bed.

In hospitals maintaining tuberculosis departments, 225 provided separate buildings, 304 had segregated units and 211 failed to show what provision was made for segregation from nontuberculous patients. In tuberculosis sanatoriums the need for isolation facilities is attested by the admission of 12,629 children, 1,191 of whom had adult type tuberculosis, 6,659 the childhood type, 824 had extrapulmonary lesions, 3,236 were nontuberculous and 701 were unclassified.

Four tuberculosis departments and 120 sanatoriums have separate buildings for children. In a few sanatoriums it was found that adults and children are allowed to associate in various ways. In a few cases children with pulmonary cases were hospitalized with children in the preventorium unit. Such conditions call for prompt corrective action.

The use of tuberculosis departments in general hospitals has been endorsed by the American Medical Association, the American Hospital Association and the National Tuberculosis Association. The endorsement, however, embodies a requirement of adequate segregation for the protection of other patients and personnel. In the crusade against tuberculosis, all institutions should keep pace with the advancing standards. There is need for increasing vigilance on the part of both specialists and general practitioners.

An attempt was not made at a relative rating of the individual institutions, but comment that would characterize the tuberculosis institutions of the United States in general would in most cases be commendatory.

GROWTH OF LONG BONES

The first observations on the growth of long bones were made by Stephen Hales,[1] whose extraordinary versatility in the field of science has generally been overshadowed by the emphasis placed on his discourses on the circulation. Among the numerous contributions of this clergyman and scientist is recorded an experiment performed in 1747 in which Hales drilled two holes in the shaft of the tibia of a chicken. Two months later the bone was examined and, although the shaft had increased an inch in length, the distance between the holes had remained the same. Hales observed that most of the lengthening of the bone had occurred at the proximal end and concluded that growth in the length of long bones results entirely from deposition of new bone at the extremities; the amount of the growth from the two ends was unequal. A little more than a century later, Ollier [2] reported the first clinical evidence of unequal growth from the two ends of long bones. He reported that when the knee joint had been resected the leg was considerably shorter than normal on reaching maturity; removal of the elbow joint under similar conditions produced little shortening of the arm.

Since these two early observations there have been many experimental and clinical reports describing the growth of long bones. However, the problem of measuring accurately the quantity of growth that takes place from each end of the principal long bones is a more difficult one. Methods and measurements have been devised and recorded, but well controlled actual measurements have been lacking. The recent detailed study by the Bisgards,[3] however, leaves little to be desired in detail and accuracy of direct measurements of the longitudinal growth of long bones. These authors worked with new-born goats and thus obtained records of the entire postnatal period of growth. When the animals were from 2 to 5 days old, the bones were marked with steel shots placed in drill holes in the shafts. Roentgenograms were taken of the bones at the beginning and the end of the experiments and at intervals during the course of investigations extending over a twelve to eighteen months period, the span of major growth. Final measurements from which growth calculations were made were obtained by actual measurement of postmortem examinations. It was possible to determine the proportion of growth that takes place at each end of each principal long bone by placing the shots at a measured distance from the epiphyseal cartilages at the ends of the shaft. The periodic roentgenograms gave the serial representation of growth; in the postmortem specimens the shots were exposed and exact measurements made of the distance between the shot and the end of each diaphysis. The differences between these measurements and those recorded at the beginning of the experiment represented the distance that the epiphyseal lines had moved during growth away from the shots, which remained as fixed points to mark the original locations of the epiphyseal lines. It was observed that the lengthening of long bones, which occurs at the ends, takes place by the deposition of layers of new bone between the end of the diaphysis and the epiphyseal cartilage and between the articular cartilage and the epiphysis. The proportion of longitudinal growth from the two ends of a long bone was found to be unequal. The rate of growth remains constant during the first two months and then progresses at half its former rate. The epiphyseal cartilage, giving the lesser increment of growth, is the first to ossify and close.

These investigations of the postnatal growth of long bones are supplemented by similar studies of prenatal growth. In order to conduct the latter experiments, the Bisgards devised a method for marking the embryonic bones as soon after the beginning of ossification as possible. This was accomplished by producing phosphorus arrest lines in the bones of the fetus by feeding phosphorus to the mothers. The results of these experiments demonstrated that prenatal as well as postnatal longitudinal growth of the long bones takes place at the ends but that growth from the two ends is proportionately more equal before than after birth, particularly during the first portion of prenatal life.

1. Clark-Kennedy, A. E.: Stephen Hales, An Eighteenth Century Biography, Clark-Kennedy, Cambridge University Press, 1929, p. 87 ff.
2. Ollier, L. X. E. L.: Traité expérimentale et clinique de la régénération des os et de la production artificielle du tissue osseux, Paris, G. Masson, 1867, vol. 1.
3. Bisgard, J. D., and Bisgard, M. E.: Longitudinal Growth of Long Bones, Arch. Surg. **31**: 568 (Oct.) 1935.

THE IRON REQUIREMENT OF MAN

The necessity of iron for the formation of hemoglobin attaches considerable importance to the question of the amount of this element needed to satisfy the daily human requirement. Attempts to ascertain this value accurately were made more than thirty years ago by the use of the balance method, which involves the simultaneous daily determination of the amount of iron ingested in the food and the amount excreted in the feces and urine. When the quantity of iron ingested just equals the quantity excreted, the subject is said to be in "iron equilibrium"; obviously, in the adult, such a state is a satisfactory one from a nutritional point of view and indicates that the diet employed contains a sufficient amount of the element in question. Moreover, the amount of iron that just suffices to maintain the subject in equilibrium represents the daily "iron requirement." If, however, the amount excreted exceeds the amount ingested, it is obvious that the diet does not contain sufficient iron to satisfy the requirement, and if the regimen should be continued a severe anemia may result. Such a situation is not uncommon in persons consuming a restricted type of diet.

Several early iron balance studies on man [1] demonstrated that equilibrium can be maintained in normal adult male subjects by diets providing as little as 10 mg. of iron daily. In order to allow a margin of safety

1. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 4, New York, Macmillan Company, 1932, p. 318.

for possible poor absorption or impaired utilization, the value of 15 mg. a day was suggested as a satisfactory standard. Recently the problem has been reinvestigated in a somewhat more satisfactory manner, longer experimental periods being employed.[2] Two normal men were maintained on a diet of low iron content for 316 and 260 days respectively. During the latter part of the period the iron content of the daily food and excreta was determined quantitatively. The daily iron intake for one subject averaged 5.2 mg.; the average daily excretion was about the same, 5.2 mg. appearing in the feces and 0.02 mg. in the urine. The other subject remained in equilibrium on a diet containing 7.8 mg. of iron daily. The iron and hemoglobin content of the blood and the erythrocyte counts of these subjects remained within normal limits during the entire period of observation. Thus it appears that the actual daily iron requirement of the normal adult male is no greater than 5 mg. A similar recent study [3] on two persons indicates that the requirement of the normal, nonpregnant adult female does not differ greatly from that of the male. However, it is possible that the amount may be slightly greater, for at least 12 mg. of iron in the form of hemoglobin is lost during each menstrual period.[2]

Because of the added nutritional stress imposed by such factors as growth, pregnancy and lactation, it is reasonable to expect that a relatively larger amount of iron would be necessary to maintain a state of equilibrium in these conditions than in the normal adult. Indeed, studies on growing and pregnant subjects support this view. It has been demonstrated repeatedly [4] that satisfactory equilibrium can be maintained in young children by diets providing 0.6 mg. of iron per kilogram of body weight. During pregnancy, a daily iron intake of from 15 to 20 mg. insures a satisfactory iron balance.[5] Of this amount, from 2 to 6 mg. daily is used to supply the demand of the growing fetus.

One point of considerable importance that has not been taken into consideration in iron balance studies is the proportion of the total iron ingested that is available for the formation of hemoglobin. If the food iron were in a form that could not be absorbed from the intestine, it obviously would appear in the feces and an apparent iron equilibrium would be maintained while in reality the subject would be experiencing iron "starvation" just as though this element were lacking in the diet. Both chemical and biologic studies [6] have demonstrated that the availability of iron for physiologic purposes varies widely in different foods. Less than one fourth of the iron present in oysters, spinach, alfalfa and blood is available for hemoglobin formation, whereas more than half of that present in beef muscle, liver, wheat, yeast, soy beans and oats is utilizable. The fact that the entire amount of iron in some foods is not available to the organism warrants the suggestion that the iron content of a satisfactory diet should exceed by a liberal margin the minimal amount actually found to satisfy the human iron requirement when the element is supplied in a readily available form.

2. Farrar, G. E., and Goldhamer, S. M.: The Iron Requirement of the Normal Human Adult, J. Nutrition **10**: 241 (Sept.) 1935.

3. Vahlteich, E. M.; Funnell, E. H.; MacLeod, G., and Rose, Mary S.: Egg Yolk and Bran as Sources of Iron in the Human Dietary, J. Am. Dietet. A. **11**: 331 (Nov.) 1935.

4. Rose, Mary S.; Vahlteich, Ella M.; Robb, Elda, and Bloomfield, Emily M.: Iron Requirement in Early Childhood, J. Nutrition **3**: 229 (Nov.) 1930. Ascham, L.: A Study of Iron Metabolism with Preschool Children, J. Nutrition **10**: 337 (Sept.) 1935.

5. Coons, C. M., and Coons, R. R.: Continuous Balances in Pregnancy, J. Nutrition **10**: 289 (Sept.) 1935.

6. Elvehjem, C. A.; Hart, E. B., and Sherman, W. C.: The Availability of Iron from Different Sources for Hemoglobin Formation, J. Biol. Chem. **103**: 61 (Nov.) 1933. Sherman, W. C.; Elvehjem, C. A., and Hart, E. B.: Further Studies on the Availability of Iron in Biological Materials, J. Biol. Chem. **107**: 383 (Nov.) 1934.

Current Comment

CLIMATE IN RELATION TO PULMONARY TUBERCULOSIS

The rôle assumed by climate in the treatment of disease has been both interesting and puzzling.[1] The effect of individual variation on the course of a disease allows only one means of study of a factor such as climate; viz., the statistical. The problem with regard to tuberculosis has been recently studied from this angle by Cowles and Chapman.[2] The data used and the method of attack were carefully considered with regard both to the underlying figures and to statistical reliability. The final study was based on the records of more than 150,000 deaths from pulmonary tuberculosis among the white populations of forty-two states. In the analysis, nineteen elements were considered which, on the basis of a priori reasoning, might be expected to influence the tuberculosis death rate. These included both climatic and nonclimatic factors. By a series of highly technical statistical analyses, six primary variants were included in the final multiple correlation. There was thus conclusive evidence of the independent significance of the factors of (1) percentage of Negroes in the population, (2) percentage of the illiterate, (3) hours of sunshine, and there was strong evidence of the significance of (4) school expense, (5) altitude and (6) occupational index. There was no contention, however, that the probabilities involved afford conclusive evidence as to specific causes, since there is always the possibility that the elements identified as apparently significant may simply be correlated highly with the true etiologic factors. The results indicate that climatic factors are of independent significance, although less so than the nonclimatic. The percentage of Negro population appears to have a considerable direct relationship to the tuberculosis death rate for the white population in the case of thirty-three states with less than 19 per cent of Negroes. In the case of nine Southern states with more than 25 per cent of Negroes, a different relationship is indicated, which might be due to the stricter segregations in these regions. Educational factors, chiefly percentage of white population illiterate and, to a lesser extent, per capita expenditures

1. Climate and Health, editorial, J. A. M. A. **103**: 683 (Sept. 1) 1934.

2. Cowles, A., and Chapman, E. N.: A Statistical Study of Climate in Relation to Pulmonary Tuberculosis, J. Am. Statist. A. **30**: 517 (Sept.) 1935

in elementary and secondary schools, represent in total importance a large part of the elements disclosed as significant. One climatic factor that seems to be definitely significant is hours of sunshine. Of additional possible significance are precipitation, daily temperature range, and altitude. The general conclusion is that, as far as the United States is concerned, higher standards of education and decreased risk of infection from Negroes, combined with life in a sunny, dry and high altitude climate seem to be more important than other climatic and environmental elements in reducing the white death rate from pulmonary tuberculosis.

Association News

ANNUAL CONGRESS ON MEDICAL EDUCATION, MEDICAL LICENSURE AND HOSPITALS

The Annual Congress of the Council on Medical Education and Hospitals of the American Medical Association will be held at the Palmer House, Chicago, Feb. 17 and 18, 1936. The Federation of State Medical Boards of the United States will participate in the congress. The program follows:

MONDAY, FEBRUARY 17, 10 A. M.

Report of the Council on Medical Education and Hospitals
Ray Lyman Wilbur, M.D., LL.D., Chairman, Stanford University, Calif.

The Accrediting of Higher Institutions
George F. Zook, Ph.D., President, American Council on Education, Washington, D. C.

Consistency Versus Chaos in Medical Education and Licensure
Walter L. Bierring, M.D., Secretary, The Federation of State Medical Boards of the United States, Des Moines, Iowa.

The State University and Professional Education
Arthur C. Willard, S.B., LL.D., President, University of Illinois, Urbana.

MONDAY, FEBRUARY 17, 2 P. M.

Swans Sing Before They Die
Elias P. Lyon, M.D., LL.D., Dean, University of Minnesota Medical School, Minneapolis.

Scope and Objectives of the Undergraduate Teaching of Obstetrics
George W. Kosmak, M.D., New York.
Charles B. Reed, M.D., Associate Professor of Obstetrics, Northwestern University Medical School, Chicago.
Robert H. Riley, M.D., Director, State of Maryland Department of Health, Baltimore.

TUESDAY, FEBRUARY 18, 9 A. M.

The Personality of the Teacher
James S. McLester, M.D., President, American Medical Association, Birmingham, Ala.

Some Observations on the Social Background of Medical Practice in Great Britain
Richard E. Scammon, Ph.D., LL.D., Distinguished Service Professor of the Graduate Faculty of the University of Minnesota, Minneapolis.

Instruction of Students and Interns in the Legal, Social and Economic Influences Affecting Medical Practice
Stanhope Bayne-Jones, M.D., Dean, Yale University School of Medicine, New Haven, Conn.

Can the Present Medical Curriculum Achieve the Proper Aims of Medical Education?
Langley Porter, M.D., Dean, University of California Medical School, San Francisco.

TUESDAY, FEBRUARY 18, 2 P. M.

Function of the Hospital in the Training of Interns and Residents
J. A. Curran, M.D., Executive Secretary, New York Committee on the Study of Hospital Internships and Residencies, New York.

The Laboratory of Pathology in the Small Hospital
Howard T. Karsner, M.D., Professor of Pathology, Director of the Institute of Pathology, Western Reserve University and the University Hospitals, Cleveland.

Newer Points of View Concerning the Use of the Outpatient Department in Medical Education
W. McKim Marriott, M.D., Dean, Washington University School of Medicine, St. Louis.

THE FEDERATION OF STATE MEDICAL BOARDS OF THE UNITED STATES

MONDAY, FEBRUARY 17, 2 P. M.

The Federation and the Survey of Medical Schools
William D. Cutter, M.D., Secretary, Council on Medical Education and Hospitals, American Medical Association, Chicago.

The Two-Year Medical School
George M. Williamson, M.D., Secretary, North Dakota State Board of Medical Examiners, Grand Forks.
Benjamin J. Lawrence, M.D., Secretary, North Carolina Board of Medical Examiners, Raleigh.

Comments on National Board Examinations
J. Stewart Rodman, M.D., Medical Secretary, National Board of Medical Examiners, Philadelphia.
Everett S. Elwood, Executive Secretary, National Board of Medical Examiners, Philadelphia.

Final Objective
Harold Rypins, M.D., Secretary, Board of Medical Examiners of the State of New York, Albany.

MONDAY, FEBRUARY 17, 6:30 P. M.

FEDERATION DINNER

Address: The Responsibility of a University in Medical Training
Eugene A. Gilmore, LL.B., LL.D., President, State University of Iowa, Iowa City.

Address: The Art of Medicine
Irvin D. Metzger, M.D., President, The Federation of State Medical Boards of the United States, Pittsburgh.

Round Table Discussion—State Board Problems

TUESDAY, FEBRUARY 18, 1:30 P. M.

Enforcement Procedure
Thomas J. Crowe, M.D., Secretary, Texas Board of Medical Examiners, Dallas.
Herbert M. Platter, M.D., Secretary, Ohio State Medical Board, Columbus.

Aggressive Versus Passive Attitudes of State Board Members
Arthur C. Morgan, M.D., Member, Pennsylvania State Board of Medical Education and Licensure, Philadelphia.

Foreign Medical Credentials
Charles B. Pinkham, M.D., Secretary, California Board of Medical Examiners, San Francisco.

Experience with Basic Science Law in Nebraska
Henry J. Lehnhoff, M.D., Secretary, Nebraska Board of Examiners in Medicine, Lincoln.

Narcotic Legislation
William C. Woodward, M.D., LL.D., Director, Bureau of Legal Medicine, American Medical Association, Chicago.

Executive Session.

RADIO BROADCASTS

The American Medical Association broadcasts over the Blue network and certain additional stations of the National Broadcasting Company at 5 p. m. eastern standard time (4 o'clock central standard time, 3 o'clock mountain time, 2 o'clock Pacific time) each Tuesday, presenting a dramatized program with incidental music under the general theme of "Medical Emergencies and How They Are Met." The title of the program is "Your Health." The program is recognizable by a musical salutation through which the voice of the announcer offers a toast: "Ladies and gentlemen, your health!" The theme of the program is repeated each week in the opening announcement, which informs the listener that the same medical knowledge and the same doctors that are mobilized for the meeting of grave medical emergencies are available in every community, day and night, for the promotion of the health of the people. Each program will include a brief talk dealing with the central theme of the individual broadcast.

The next three programs are as follows:

December 10. Hunting Accidents, Morris Fishbein, M.D.
December 17. Animal Diseases in Man, W. W. Bauer, M.D.
December 24. No broadcast.

This program is broadcast also on the short waves through KDKA, Pittsburgh, over station W8XK, 11,870 and 12,210 kilocycles.

THE KANSAS CITY SESSION

Special Exhibit on Fractures in the Scientific Exhibit

The Committee on Scientific Exhibit of the Board of Trustees has announced that the special exhibit on fractures will be resumed at the Kansas City session under the direction of a committee composed of Kellogg Speed, chairman, Chicago; Frank D. Dickson, Kansas City, and Walter Estell Lee, Philadelphia. For five years, from 1927 to 1931, the fracture exhibit was carried on as a regular feature of the annual session, but for the last four years it has been omitted.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

ALABAMA

Chamber of Commerce Honors Physician.—A resolution was adopted by the Mobile Chamber of Commerce, October 3, in appreciation of the services of the late Dr. Herbert P. Cole, Mobile, and expressing regret over his recent death. Dr. Cole was a former president of the chamber of commerce.

Hookworm Survey.—A survey of all the school children in Baldwin County was begun, October 1, under the direction of Dr. Stephen A. Durick, Bay Minette, county health officer, to determine the presence of hookworm. Specimens will be analyzed in the laboratory of the state health department and reports of the examinations will be submitted to the parents. Children showing a positive report will be given treatment for hookworm free of charge. Examinations of parents and preschool children will also be made on request.

CALIFORNIA

Popular Medical Lectures.—The fifty-fourth course of popular medical lectures for 1936 at Stanford University School of Medicine will be held on alternate Friday evenings, beginning January 3, with Dr. Edward C. Sewall as the first speaker, on "Sinusitis, Allergy and the Common Cold." Other lecturers in the series are:

Dr. Thomas Henshaw Kelly, January 17, Public, Patient, Physician and Health Insurance.
Dr. C. Frederick Fluhmann, January 31, Superstitions, Facts and Theories of Menstruation.
Dr. George H. Becker, February 14, Success of Control of Communicable Diseases in San Francisco.
Dr. Albert D. Davis, February 28, Value and Limitations of Plastic Operative Procedures.
Dr. Thomas G. Inman, March 13, Present Conceptions of the Nature of Mind.

CONNECTICUT

Changes in Health Officers.—Dr. Thomas F. O'Brien has been appointed acting health officer for the city and town of Hartford, succeeding Dr. Charles P. Botsford, who retired after twenty-seven years' service. Dr. John A. Bucciarelli has succeeded Dr. Myron J. Brooks, retired, as health officer of New Canaan. Dr. Michael D. Riordan has been appointed health officer of the town of Windham for a term of four years.

Dr. Nicholas Named Professor of Comparative Anatomy.—John S. Nicholas, Ph.D., associate professor of comparative anatomy, Yale University, New Haven, has been appointed Bronson professor of comparative anatomy. The appointment is the first to this chair since 1927, when Dr. Ross G. Harrison, the incumbent at that time, was named Sterling professor of biology in the medical school. Dr. Nicholas received the degree of doctor of philosophy from Yale in 1921. He was associated with his alma mater as assistant in biology from 1917 to 1919 and was instructor in anatomy at the University of Pittsburgh School of Medicine from 1921 to 1922, when he became assistant professor. In 1926 he returned to Yale, becoming associate professor of comparative anatomy in 1932.

DISTRICT OF COLUMBIA

Dr. Coulter Named Tuberculosis Coordinator.—Dr. Archibald Barklie Coulter has been appointed tuberculosis coordinator of the District of Columbia. His first task will be to coordinate efforts being made by public and private agencies to locate persons unaware that they have tuberculosis and see that provision is made for their treatment. A campaign against tuberculosis was begun in the district, November 25, with funds made available by the Works Progress Administration.

Radio Advisory Board.—An advisory board has been appointed for the radio broadcasts of the Medical Society of the District of Columbia with Drs. Roy Lyman Sexton, chairman, Harry Arnold McNitt, vice chairman, and Herbert P. Ramsey, member ex officio. Representatives on the board for the society at large are Drs. James A. Cahill Jr., Roger S. Cohen, Tomas Cajigas and Robert A. Bier; for the health department, Dr. Daniel L. Seckinger, deputy health officer; for the U. S. Public Health Service, Dr. Ralph C. Williams, assistant surgeon general, and for the National Broadcasting Company, Mr. Stanley Bell, technical adviser.

FLORIDA

Personal.—Dr. Ralph E. Stevens, assistant surgeon, Veterans' Administration Facility, Bay Pines, has been appointed city physician and superintendent of the municipal public health service.——Dr. Leon H. O'Quinn has been elected mayor of Hialeah.——Dr. Huston J. Banton, captain, U. S. Army Medical Corps, has been appointed a deputy district health officer of the state board of health of Florida.——Dr. Harry C. Galey Jr. was recently elected mayor of Key West.

Public Health Meeting.—The Florida Public Health Association held its seventh annual meeting in Orlando, December 2-4, at the Colonial Orange Court Hotel. Speakers included:

Dr. Herbert L. Bryans, president, Florida Medical Association, Attitude of the Florida Medical Association Toward Public Health.
Dr. Halbert L. Dunn, chief statistician for vital statistics, U. S. Bureau of the Census, Washington, D. C., Importance of Vital Statistics to the Citizen.
Dr. Reginald M. Atwater, executive secretary, American Public Health Association, New York, Team Work in Public Health.
Dr. William W. Bauer, director, bureau of health and public instruction, American Medical Association, Coordination of Private Practice and Preventive Medicine.
Dr. Kendall Emerson, managing director, National Tuberculosis Association, New York, Tuberculosis in a State Health Department Program.

A public meeting was held Monday evening, December 2, with the following speakers: Dr. Edward S. Godfrey Jr., assistant commissioner of health of the state of New York, "What the Public Should Know About the Control of Diphtheria"; Conrad Van Hyning, commissioner of social welfare, Jacksonville, "Public Health Aspects in Social Work," and Dr. James P. Leake of the U. S. Public Health Service, "Present Knowledge of Prevention and Control of Poliomyelitis."

GEORGIA

Officers of State Medical Board.—Dr. Frank M. Ridley Jr., LaGrange, has been appointed for a term of four years to the state board of medical examiners to succeed Dr. Burr T. Wise, Americus. Drs. James M. Baird, Columbus, and Jesse L. Howell, Atlanta, were reappointed for four year terms. Dr. Baird is president of the board and Dr. Howell, vice president.

Society News.—Dr. Alton V. Hallum read a paper before the Fulton County Medical Society, Atlanta, November 7, entitled "Eye Changes in Hypertensive Toxemia of Pregnancy (A Study of 300 Cases)," and Dr. James N. Brawner Jr. gave a clinical talk on "Hormone Treatment of Gonococcal Vaginitis in Children."——At a meeting of the Spalding County Medical Society in Griffin recently, speakers included Drs. Earl H. Floyd and James L. Pittman, Atlanta, on "Operation on the Single Kidney for the Removal of Calculi."

ILLINOIS

State Health Conference.—The annual state health conference will be held in Springfield, December 10-11. The control of communicable diseases will be the theme of the two day session and the functions of diagnostic laboratories, essentials of sanitary supervision over milk supplies, practices in public health administration and methods of health education will also be considered. Speakers will include Drs. Logan Clendening, clinical professor of medicine, University of Kansas School of Medicine; Lloyd D. Felton, Baltimore; John P. Koehler, commissioner of health of Milwaukee, and Maud E. Watson, Ph.D., director, child guidance division, Children's Fund of Michigan, Detroit.

Chicago

Drive to Reduce Noise.—A campaign against inadequately muffled exhausts of automobile, motorcycle and truck engines will be in force by the traffic division of the city police department during December, it is announced. A summons will be issued to all violators to enforce the city ordinance and state statute that require all motor vehicles to be equipped with adequate mufflers.

Premedical Requirements Raised to Three Year Minimum.—Students entering Loyola University School of Medicine in October 1939 must present a minimum of three years of college (premedical) work, according to an announcement from the dean. Accordingly, all students enrolling in the premedical curriculum beginning in the fall of 1936 will be subject to the three year premedical requirement. The predental requirement was raised from one to two years, to become effective in the fall of 1937.

Dr. Sevringhaus to Lecture at Psychoanalytic Institute.—Dr. Elmer L. Sevringhaus, associate professor of medicine, University of Wisconsin Medical School, Madison, will lecture on "Clinical Pathology of Endocrine Disturbances" at

the Institute for Psychoanalysis, December 10. According to previous announcement, Dr. Solomon Strouse was to have been the speaker but illness has compelled him to leave Chicago for the winter. Dr. Sevringhaus will also lecture, January 10, when he will review the results of the clinical research of his group during the last few years on the mental and peripheral nervous disturbances associated with various irregularities in the menstrual cycle and during the menopause. Those who wish to attend these lectures are asked to notify the institute in advance. A luncheon will be held at the Tavern Club, December 10, in honor of Dr. Sevringhaus.

INDIANA

Outbreak of Food Poisoning in Prison. — Seventy-two prisoners in the county jail in Indianapolis became ill immediately after the noon meal, November 20, and five of them were taken to the city hospital suffering from food poisoning, newspapers reported.

Society News. — Dr. Emil G. Vrtiak, Chicago, discussed arthritis before the Montgomery County Medical Society in Crawfordsville, November 21. —— At a meeting of the Fort Wayne County Medical Society in Fort Wayne, November 19, Dr. Carroll S. Wright, Philadelphia, spoke on the treatment of syphilis.——The Kosciusko County Medical Society was addressed in Warsaw, November 19, by Dr. Fred O. Clark, Syracuse, on sciatic pain. A resolution was adopted at this meeting in memory of Dr. C. Norman Howard, who died November 11.——At a meeting of the Thirteenth District Medical Society, November 6, in Rochester, speakers included Drs. Aaron Arkin and George H. Gardner, Chicago, on "Differential Diagnosis of Organic Heart Lesions" and the unhealthy cervix, respectively, and Dr. Orus R. Yoder, Ypsilanti, "The Psychological Management of the Patient." Dr. Arthur E. Hertzler, Kansas City, Mo., gave the banquet address on "Office Management of Stomach Complaints." Dr. Arkin also conducted a heart clinic. —— The meeting of the Indianapolis Medical Society, November 19, was devoted to a discussion of diseases of the gastro-intestinal tract; the speakers were Drs. Homer H. Wheeler, Julius H. P. Gauss and Walker Stoeffler.

LOUISIANA

Society News. — A symposium on cancer was presented before the New Orleans Parish Medical Society, November 25, by Drs. James T. Nix, Curtis H. Tyrone and Gilbert C. Anderson.——Dr. Emil Novak, Baltimore, delivered a paper before the New Orleans Gynecological and Obstetrical Society, November 29, entitled "Ovarian Tumors."

A Record in Cancer Education.—Louisiana has made a striking record in cancer education, according to the *Bulletin* of the American Society for the Control of Cancer. Under the chairmanship of Dr. John A. Lanford, New Orleans, of the committee on cancer of the state medical society, ninety-two radio talks have been given, 501 newspaper articles have been distributed and thirty-three public meetings with a total attendance of more than 7,400 have been held. Seventeen study courses for nurses have also been held.

MASSACHUSETTS

Dr. Freeman Wins the Warren Prize. — The Warren Triennial Prize of $500 has been awarded by the general executive committee of the Massachusetts General Hospital, Boston, to Dr. Norman E. Freeman, a member of the staff, for an essay on "The Physiology of Gangrene." The prize was founded by the late J. Mason Warren in memory of his father and is awarded every three years. Previous to 1934 there have been sixteen awards of this prize, thirteen going to men in this country and three to foreigners.

Sanatorium Honors Memory of Founder.—Sharon Sanatorium, Sharon, a tuberculosis hospital, has recently published a special edition of its 1929 annual report as a memorial to Dr. Vincent Y. Bowditch, founder of the institution, who died in that year. The report, entitled "His Last Year," is the thirty-ninth issued by the sanatorium. Dr. Bowditch was a past president of the National Association for the Study and Prevention of Tuberculosis, now the National Tuberculosis Association, and at one time was medical director of the institution he founded. Sharon Sanatorium was opened in 1891 and now has a capacity of fifty-one beds.

Personal. — Dr. Charles Moline, Sunderland, was recently chosen president of the Franklin County Public Health Association. —— Dr. Alice Hamilton, Boston, recently appointed technical adviser on industrial poisons, U. S. Department of Labor, was guest of honor at a luncheon meeting, November 21, given by the Consumers' League of Massachusetts. —— The recent retirement of Dr. George Burgess Magrath, Boston, as medical examiner of Suffolk County on account of ill health will not interfere with his position as professor of legal medicine in the Harvard Medical School or with his functioning as a consulting medicolegal pathologist. —— Dr. Riley H. Guthrie, assistant to the commissioner in the department of mental diseases, has been named chief executive officer of the Boston Psychopathic Hospital.

MICHIGAN

Dr. Lavan Named Health Officer of Grand Rapids.— Dr. John L. Lavan, for four years director of the department of public health and welfare of Kalamazoo, has resigned to become commissioner of public health of Grand Rapids, effective December 1. Grand Rapids, which is Dr. Lavan's home city, has a population of more than 168,000. The new commissioner is a graduate of the University of Michigan Medical School, Ann Arbor. He was formerly epidemiologist with the Kansas City, Mo., health department and at one time was health commissioner of Toledo.

Society News.—At a meeting of the Eaton County Medical Society in Charlotte, recently, Dr. Don V. Hargrave, Eaton Rapids, discussed gastric hemorrhage. —— Dr. Frederick A. Coller, Ann Arbor, discussed gallbladder disease before the Oakland County Medical Society, October 20, in Pontiac.—— Dr. Garner M. Byington, Battle Creek, medical director of the Kellogg Foundation, was elected president of the Michigan Public Health Association at its annual meeting, November 7, in conjunction with the annual Michigan Health Conference. ——A symposium on anesthesia was presented before the Wayne County Medical Society, November 4, in Detroit, by Drs. James E. Watson, Myra E. Babcock and Francis J. Murphy, all of Detroit.

Dinner to Dr. Warnshuis.—Dr. Frederick C. Warnshuis, formerly secretary of the Michigan State Medical Society and now holding a similar position with the California Medical Association, San Francisco, was guest of honor at a dinner at the Wayne County Medical Society in Detroit, November 11. Among those present were seven former presidents of the state medical society: Drs. Andrew P. Biddle, 1917, 1918; Angus McLean, 1920; Guy L. Connor, 1923; Herbert E. Randall, Flint, 1927; Louis J. Hirschman, 1928; Carl F. Moll, Flint, 1932, and James Milton Robb, 1933. In addition, the present president, Dr. Grover C. Penberthy, attended. Dr. Warnshuis discussed "Medical Practice in California" before the medical section of the society, November 11, and Dr. Hugh L. Stalker, Grosse Pointe, showed moving pictures of the mechanism of the heart beat and electrocardiography.

MISSOURI

Pilgrimage to Beaumont's Grave.—Members of the St. Louis Medical Society arranged a pilgrimage to the grave of William Beaumont in Bellefontaine Cemetery, November 21, the one hundred and fiftieth anniversary of Beaumont's birth. Dr. Beaumont was born in Lebanon, Conn., Nov. 21, 1785, and died in St. Louis, April 25, 1853. Wreaths were placed on Dr. Beaumont's grave by representatives of the Southern Medical Association, Southern Association of Anesthetists, Missouri State Medical Association, International Anesthesia Research Society and the Midwest Association of Anesthetists and the St. Louis Medical Society.

NEW YORK

New Medical School for Syracuse.—Federal funds have recently been made available for the erection of a new building for the University of Syracuse School of Medicine, construction to begin December 15. The new building will be a new unit in a medical center that now contains the City Hospital, Syracuse Memorial Hospital and the Syracuse Psychopathic Hospital. It will be three stories high and will cost $1,250,909, according to the Syracuse *Herald*. It is expected that the building will be completed within a year.

Society News.—Drs. Leon E. Sutton and Frederick S. Wetherell, Syracuse, addressed the Oswego County Medical Society, Oswego, October 15, on "Local Anesthesia in Minor Surgery" and "Present-Day Problems in Medical Economics," respectively.——Dr. Raeburn J. Wharton, Johnson City, recently addressed the Schoharie County Medical Society, Cobleskill, on "Anorexia in Childhood."——Dr. Emanuel D. Friedman, New York, addressed the Medical Society of the County of Cortland, Cortland, December 6, on "Encephalitis and Cerebral Vascular Accidents." Dr. Peter G. Denker, New York, spoke, November 15, on "Diseases of the Spinal Cord and Peripheral Nerves." —— Dr. Hugh H. Young, Baltimore, addressed the Glens Falls Academy of Medicine, October 25, on cancer of

the prostate.——Drs. Wardner D. Ayer, Syracuse, and Joseph S. Lawrence, Albany, addressed the Franklin County Medical Society, Malone, October 23, on intracranial hemorrhages and the work of county medical societies, respectively.——Dr. Eldridge H. Campbell Jr., Albany, gave a lecture on "Early Diagnosis of Brain Tumors" before the Fulton County Medical Society, Johnstown, in October.

New York City

Eight Made Ill by Cream Puffs.—Eight persons from the lower east side suffered from food poisoning within a few hours after having eaten cream puffs, November 11. All were taken to Bellevue Hospital.

Third Harvey Lecture.—Dr. Francis Peyton Rous of the Rockefeller Institute for Medical Research delivered the third Harvey Lecture of the winter, December 5, at the New York Academy of Medicine. His subject was "The Virus Tumors and the Tumor Problem."

The Welch Lectures. — Dr. George Hoyt Whipple, dean and professor of pathology, University of Rochester School of Medicine, Rochester, will deliver the William Henry Welch Lectures at Mount Sinai Hospital, December 12-13. Dr. Whipple's subjects will be "Ways and Means of Hemoglobin Construction Within the Body" and "Plasma Protein Regeneration as Influenced by Various Factors."

Resolution Concerning New Hospitals. — The Hospital Council of the City of New York at a meeting November 6 adopted a resolution taking the position that it is inadvisable for public or private hospital authorities to commit themselves to any major program of hospital construction without conferring with the council. In the opinion of the council no such project should be launched unless it can be shown to be necessary, timely, reasonably assured of support, and wisely located.

Personal. — Dr. Nathan Ratnoff, medical director of the Beth Israel and Jewish Maternity hospitals, was guest of honor at a dinner at the Waldorf Astoria, November 12, in celebration of his sixtieth birthday.——Dr. Charles Walter Clarke, medical director of the American Social Hygiene Association, has been appointed temporary director of the bureau of venereal disease in the city department of health, a half time position.——Mr. Henry C. Wright, hospital consultant and for many years president of the Queensboro Tuberculosis and Health Association, died October 24.

Society News.—Dr. Michael Canick delivered an afternoon lecture before the Medical Society of the County of Queens, November 15, on "Common Rectal Diseases—Office Treatment." Dr. Benjamin M. Bernstein gave a lecture in October on ulcerative colitis. —— Dr. Charles F. Geschickter, Baltimore, addressed the International Association of Industrial Surgeons, October 31, on "Bone Tumors in Their Relation to Trauma." ——Dr. Hermann Holthusen, professor of radiology, University of Hamburg, Germany, gave the Middleton Goldsmith Lecture of the New York Pathological Society, December 10, at the New York Academy of Medicine. His subject was "Biological Effects of Radiation on the Cells."——Dr. William P. Healy gave the fourth afternoon lecture of the New York Academy of Medicine, December 6, on "Significance of Uterine Bleeding in Later Life"; Dr. George Draper will give the fifth, December 13, on "Significance of the Human Constitution in Clinical Medicine."——Drs. Harold J. Stewart and Archibald G. MacLeod were speakers at a scientific meeting of the New York Heart Association, the heart committee of the New York Tuberculosis and Health Association, December 3, on "Cardiac Output" and "The T Deflection of the Electrocardiogram," respectively.——Dr. George F. Chandler, Kingston, addressed the Society of Medical Jurisprudence, November 11, on "Causes and Treatment of Crime."——Dr. Josephine B. Neal addressed the Women's Medical Association of New York City, November 13, on "Newer Developments in Poliomyelitis."

PENNSYLVANIA

Society News. — Dr. John T. Farrell Jr., Philadelphia, addressed the Northampton County Medical Society, Easton, November 14, on "Causes of Bronchial Occlusion and Their Importance in the Production of Respiratory Symptoms."—— The Chester County Medical Society sponsored a public health meeting in Chester as its observance of state health day, November 19; speakers were Drs. Martha Edith MacBride-Dexter, state secretary of health, on tuberculosis, and Arthur C. Morgan, Philadelphia, on progress of medicine in the past fifty years. —— Dr. Jesse O. Arnold, Philadelphia, addressed Washington County physicians at Hillsview Farms Sanatorium, Washington, November 13, on "More Rational Methods in Prevention and Control of Eclampsia," with discussion by Drs. Paul Titus, Pittsburgh, and James R. Bloss, Huntington, W. Va.

Philadelphia

Seminars on Tuberculosis.—The second series of graduate seminars sponsored by the Philadelphia County Medical Society, dealing with clinical application of laboratory methods in tuberculosis, began November 29, with the following lecturers: Drs. William P. Belk, on "Variations in the Blood Count and Their Significance"; Jacob W. Cutler, "The Sedimentation Rate"; Abraham Cantarow, "Blood Sugar and Blood Cholesterol: Significance of Variation"; Frederick William Sunderman, "Minerals in the Blood and Their Significance." Speakers, December 6, were Henry L. Bockus, "Interpretation of Gastric Analysis"; Louis H. Clerf, "The Gastroscope," and B. B. Vincent Lyon, "Biliary Drainage." Coming lectures are:

December 13: Drs. Charles C. Wolferth, Laboratory Examination of the Heart—Electrocardiographic Interpretation; Isaac Starr Jr., Circulation Time and Minute Volume Studies; Alexander Margolies, Heart Sounds—The Stethograph; Charles L. Brown, Blood Pressure and Its Variation.

December 20: Drs. Joseph B. VanderVeer, The Basal Metabolic Rate—A Discussion of Its Determination; Edward L. Bortz, Variations in the Metabolic Rate and Their Practical Significance, and Francis F. Borzell, X-Ray and Its Clinical Application.

Research Laboratories Transferred. — The Cancer Research Laboratories of the Graduate School of Medicine of the University of Pennsylvania have been transferred to the Franklin Institute and will be continued under the name of Biochemical Research Foundation. Dr. Ellice McDonald will continue as director, with forty-two research workers on the staff. Thomas S. Gates, president of the university, explained in his annual report that the change was made because Mr. Irénée du Pont, who provided funds for the research, could not agree with the university's policy on the question of rewards for scientific research. Last year the university formally adopted the policy that all discoveries should be made available to the public without any profits accruing to the individuals or the institution responsible. Mr. du Pont is said to have expressed the opinion that greater progress would be made if some definite form of financial reward was held forth. He also felt it would be well for the foundation to patent discoveries with the intent of using profits or income to pay for further research. Mr. du Pont established the cancer research department anonymously in 1927.

Pittsburgh

Research Chemist Honored.—Edward R. Weidlein, director of Mellon Institute for Industrial Research, received the Chemical Industry Medal for 1935 at a joint meeting of the New York section of the American Chemical Society and the American section of the Society of Chemical Industry in New York, November 8, at the Chemists Club. Dr. Weidlein is a graduate of the University of Kansas, from which he received the master of arts degree in 1910. He received the honorary degree of doctor of science from Tufts College in 1924 and doctor of laws from the University of Pittsburgh in 1930. He joined the staff of Mellon Institute in 1912 and became director in 1921. His investigations in the field of medicine include epinephrine and recently, in cooperation with Western Pennsylvania Hospital, treatment of pneumonia and allied pulmonary diseases.

TENNESSEE

Physicians in Attendance at Births.—Eighty-six per cent of births reported to the state health department in 1934 were attended by physicians, according to a recent report. In cities the percentage was 98, while it was 82 in rural districts. There were ten counties in which less than half the births were attended by physicians. In 1934 physicians signed 93.3 per cent of the death certificates. Including certificates signed by health officers and coroners, the percentage of certificates correctly signed was 95.6, compared with 93.3 the previous year.

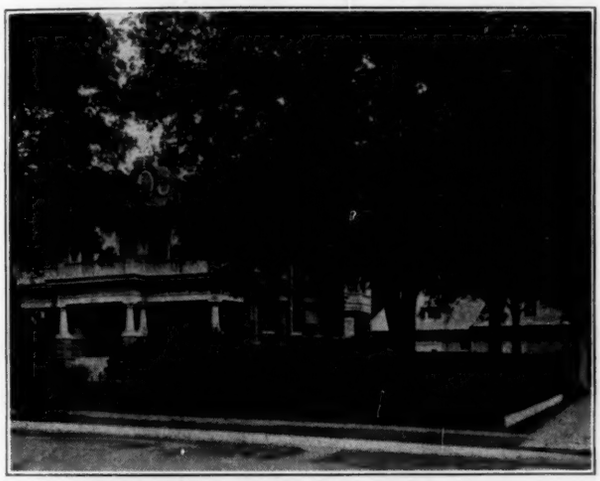
Society News. — The Chattanooga Surgeons Club was recently organized with Dr. William J. Sheridan as president. ——Drs. John H. Musser, New Orleans, and James B. McElroy, Memphis, were guest speakers at a meeting of the third councilor district medical society in Chattanooga in October, on disease of the gallbladder and heart disease, respectively.—— Drs. Russell A. Hennessey and Conley H. Sanford, Memphis, addressed the Gibson County Medical Society, Trenton, October 28, on "Treatment of Gonorrhea in the Male" and "Further Experience with Mechanical Drainage of the Lung in Pneumonia," respectively.——Dr. John Roberts, Kingston, addressed the Roane County Medical Society, Harriman, October 15, on induced pneumothorax.——Dr. James Leslie Bryan and J. H. Phillips, D.D.S., Nashville, addressed the Robertson County Medical Society, Springfield, October 15, on "Acute Suppurative Mastoiditis" and "The Middle Ground Between Medicine and Dentistry," respectively.——Dr. Robert L. Sanders, Memphis, was guest speaker at the annual meeting of the East

Tennessee Medical Association in Elizabethton in October. Dr. Estill L. Caudill, Elizabethton, was elected president.—— Drs. Charles A. Bender and Frank D. Linn, Memphis, addressed the Memphis and Shelby County Medical Society, Memphis, October 15, on "Ileus" and "Fractures Through the Ethmoid Sinuses," respectively.—— Drs. Stanton S. Marchbanks and Buchanan S. Wert addressed the Chattanooga and Hamilton County Medical Society, Chattanooga, October 24, on hyperparathyroidism and peptic ulcer.

TEXAS

Changes at University of Texas.—At the beginning of the fall term at the University of Texas School of Medicine, Galveston, Dr. Jarrett E. Williams, formerly of Durham, N. C., succeeded Dr. Jesse Morris Horn as adjunct professor of pathology; Dr. William B. Sealy, instructor in anatomy, succeeded Dr. Francis J. L. Blasingame as adjunct professor of anatomy. Dr. Horn moved to Fort Worth and Dr. Blasingame to Detroit. In the department of biologic chemistry, Felix Paquin, Galveston, succeeded Marion Fay, Ph.D., associate professor; Dr. Fay resigned to become professor of physiologic chemistry at the Woman's Medical College of Pennsylvania. Dr. William S. Carter, who returned to the school as dean to succeed the late Dr. George E. Bethel, was guest of honor at a banquet arranged by alumni and former students. Dr. Carter was dean seventeen years ago.

New Home for State Medical Association.—The Texas State Medical Association has bought a two-story brick residence in Fort Worth as a home for the association and



New home of Texas society.

its library. It is near the Medical Arts Building and five hospitals, as well as the business district, the railway stations and the postoffice. The house is said to be in such good condition and so arranged that no alterations will be necessary for immediate occupancy. It has a spacious lawn with trees, flowers and shrubs and has also a garage building which will provide a large storage space. For some time the association has recognized the necessity for larger quarters, especially for the development of its library. It is hoped that with permanent quarters the library will receive endowments not only from members of the profession but from laymen as well. The new address is 1404 El Paso Street, Fort Worth.

WASHINGTON

Personal.—Dr. Arthur E. Wade, Seattle, has been appointed school physician of the city to succeed Dr. Ira C. Brown, who occupied the position for twenty-two years.—— Dr. Roger Anderson, Seattle, was chosen president-elect of the Western Orthopedic Association at the annual meeting in San Francisco in October.

Society News.—Drs. Delmar F. Bice, Yakima, and Frank J. Clancy, Seattle, addressed the Walla Walla Valley Medical Society, Walla Walla, November 14, and the Pierce County Medical Society, Tacoma, November 12, on social medicine. ——The Washington State Radiological Society was organized in October, with Dr. Harold E. Nichols, Seattle, as president and Dr. Terence T. Dawson, Seattle, as secretary.—— Drs. Roger Anderson and Robert D. Forbes, Seattle, addressed the King County Medical Society, December 2, on "Ambulatory Method of Treating Fractures of the Shaft of the Femur" and "Appendicitis," respectively.

WISCONSIN

Memorial Lecture.—The University of Wisconsin Medical Society and the Phi Chi medical fraternity sponsored a memorial lecture, November 26, for the late Dr. Charles R. Bardeen, dean of the medical school for many years. Dr. Anton J. Carlson, professor of physiology, University of Chicago, gave the address on "Science, Medicine and the Common Life."

Society News.—Dr. Edward F. Barta, Milwaukee, gave an illustrated talk on "Malignancies of the Skin" before the Brown-Kewaunee-Door Counties Medical Society at Alaska, October 25.——Drs. Charles K. Maytum and Edwin J. Kepler, Rochester, Minn., addressed the Chippewa County Medical Society, October 23, Chippewa Falls, on "Allergy" and "Syndromes Associated with Diseases of the Pituitary Body and the Suprarenal Glands," respectively.——Drs. Frank A. Boeckman, Marshfield, and Waldo W. Stiles, Arpin, among others, addressed the Wood County Medical Society, Wisconsin Rapids, October 15, on "Prevention of Scarlet Fever" and "Multiple Myeloma," respectively.

GENERAL

Alpha Omega Alpha Lecture.—Dr. Anton J. Carlson, professor of physiology, University of Chicago, will deliver the annual Alpha Omega Alpha lecture at the Kansas City session of the American Medical Association, May 14.

Grants Available.—The committee on grants-in-aid of the National Research Council announces that it will meet next in March 1936. Applications for grants to be considered at this meeting must be on file with the secretary, Clarence J. West, before February 15. The address is 2101 Constitution Avenue, Washington, D. C. Additional information and application blanks will be furnished on request.

Society News.—The Eastern Interstate Medical Economics Conference held a meeting in New York, October 13. Thirty-six representatives attended from seven state medical societies: Indiana, Maryland, Michigan, New Jersey, Pennsylvania and the District of Columbia. Dr. Frederic E. Elliott, Brooklyn, is president of the conference and Dr. Francis F. Borzell, Philadelphia, secretary.——Dr. Walter H. McNeill Jr., New York, was elected president of the New York Central Surgeons' Association at the annual meeting in Columbus, Ohio, October 28.

Medical Supplies for Ethiopia.—Medical supplies and equipment, including a truck and half a ton of bandages and other necessities, were recently presented to the Ethiopian government through John M. Shaw, Ethiopian consul general, in New York. The gift was made possible through the work of American Aid for Ethiopia, a national organization of which William Jay Schieffelin, Ph.D., New York, is chairman. Haile Selassie recently appealed for volunteer American physicians, nurses and hospital supplies. In a letter transmitted through the New York *Times*, the emperor advised volunteers to communicate with Dr. Thomas A. Lambie, American physician, who is secretary general of the Ethiopian Red Cross, at Addis Ababa.

Prevalence of Poliomyelitis.—One hundred and fifty-three cases of poliomyelitis were reported throughout the United States for the week ended November 2, as compared with 109 for the similar period of 1934. During this weekly period the largest number of cases (twenty-eight) was reported in Massachusetts, while the next highest number (twenty-three) occurred in New York. Pennsylvania came third, with a total of nineteen. For the corresponding period of 1934, Washington had the highest number (fourteen). California and Texas were second with eleven cases each. There were 9,992 cases of the disease tabulated in the first forty-four weeks of 1935, compared with 6,759 for the corresponding period of 1934.

"Fight Cancer with Knowledge."—The American Society for the Control of Cancer, in its November bulletin, announces a nation-wide campaign to educate the public on the subject of cancer. The bulletin points out that the society has spent most of its time surveying and recording basic facts concerning cancer diagnosis and therapy because it wished to make certain that the profession was prepared to care for the increase in work which a campaign of lay education would bring about. The directors of the society have now unanimously agreed that existing facilities are entirely adequate for more patients than are now availing themselves of the opportunity of early diagnosis and treatment. The society's slogan, "Fight Cancer with Knowledge," will be the theme of the campaign.

Examinations in Obstetrics and Gynecology.—Written examinations and review of case histories of group B applicants for certification by the American Board of Obstetrics and Gynecology will be held in various cities, March 28. Applications for group B must be filed not later than February 28.

The oral clinical and pathologic examination of all candidates for certification will be held in Kansas City, May 11-12, 1936, immediately prior to the scientific session of the American Medical Association. Applications for group A candidates must be received not later than April 1. The annual informal dinner and general conference of diplomates of the board will be held Wednesday evening, May 13, at the Hotel Kansas Citian. For further information apply to the secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh.

Southern Surgical Association.—The forty-eighth annual session of the Southern Surgical Association will be held in Hot Springs, Va., December 10-12, with headquarters at the Homestead. Among speakers announced on the program are:

Dr. Parke G. Smith, Cincinnati, Anatomical and Mechanical Factors Involved in Nephroptosis.
Dr. Waltman Walters, Rochester, Minn., Successful Plastic Operations for Hypospadias.
Dr. Burr N. Carter, Cincinnati, Technic of Thoracoplasty for Pulmonary Tuberculosis.
Dr. Joseph E. J. King, New York, Brain Abscess.
Dr. Bradley L. Coley, New York, Surgical Treatment of Giant Cell Tumor.

At the annual dinner, Wednesday evening, Dr. Harvey B. Stone, Baltimore, will be toastmaster, and speakers will be Drs. James Tate Mason, Seattle, President-Elect of the American Medical Association, and Robert L. Payne, Norfolk, Va., president of the surgical association.

Government Services

Stoner Violates Food and Drugs Act

A fine of $2,000, the maximum penalty, was imposed on "Dr." George DeWitt Stoner, Lakeland, Fla., in federal court at Tampa in November for violating the federal Food and Drugs Act. Stoner was placed on probation for two years. In November 1934, Stoner was sentenced for a similar violation and was placed on probation. The recent investigation disclosed that Stoner's wife was continuing the sale of "Dr. Pener's Uterine Tablets" and "Regulator Pills" (Compound Pills-Tansy Pennyroyal) to former customers under labels from which the false claims had been removed. The court considered this to be a violation of his probation. Stoner claims graduation from the Curtis Physio-Medical Institute of Marion, Ind., in 1896. The institution was said to be a poor excuse for a medical school and the American Medical Association has had no opportunity of checking up the record, since it has been unable to find that there were any records. Stoner also claims to have attended Wichita Medical College and the Hahnemann Medical College. The former had no graduates. The Hahnemann school was closed by its board of trustees. In 1904 this college absorbed the Chicago Homeopathic Medical College. There is no record that Stoner was licensed in Indiana in 1897, as claimed.

Positions for Interns and Residents at St. Elizabeth's Hospital

The U. S. Civil Service Commission announces competitive examinations for positions as junior medical officer at St. Elizabeth's Hospital, Washington, D. C. It is expected that there will be two vacancies July 1, 1936, and two Oct. 1, 1936, for internships and about five vacancies for psychiatric residents July 1. The internship consists of a two year rotating service of four months of surgery, four months of acute medical service, four months of chronic medical service, six weeks each of obstetrics and pediatrics (affiliation), three months of laboratory work and six months of psychiatry. Candidates will not be required to report for examination at any place but will be graded on their education and experience. Applicants for the internship must be senior students in a grade A medical school and applicants for the residencies must have been graduated from a grade A medical school not prior to Jan. 1, 1934, and must have completed an accredited internship. Applicants must not have reached their fortieth birthday on the date of the close of receipt of applications. They must be in sound physical health. Application forms may be obtained from the secretary of the Board of Civil Service Examiners at any first class post office, from the commission at Washington, D. C., or at any district office of the commission in the following cities: Atlanta, Boston, Chicago, Cincinnati, Denver, New Orleans, New York, Philadelphia, Seattle, St. Louis, St. Paul, San Francisco, Honolulu, Balboa Heights, C. Z., and San Juan, Puerto Rico. Applications must be filed not later than December 16.

Foreign Letters

LONDON

(From Our Regular Correspondent)

Nov. 9, 1935.

The Right to Die

The formation of a society to promote legislation to render legal the termination of life in painful and incurable disease, at the request of the patient, has been reported in a previous letter. The story of a kindly, elderly family doctor who said he has broken the law and taken life and would do it again if need be is given in the *Daily Mail* by "a special correspondent." Details are not given of the cases, but they were evidently instances of incurable patients dying from cancer, to whom an overdose of morphine was administered. The physician had the patient write a request for release from suffering, which was signed not only by himself but by his wife and family. The act was certainly illegal.

These revelations have given rise to correspondence in the *Daily Mail*. A London consultant writes that no matter how regrettable many aspects of the disclosures may be, the fact remains that in all countries physicians, actuated by the highest humanitarian motives, do at times take what amounts to a sacred judgment into their power. Such actions are jealously guarded, even within the ranks of the profession. Even the nursing staff would generally not be aware of them. Dr. C. Killick Millard, secretary of the newly formed Voluntary Euthanasia Legalization Society, writes that other physicians have told him stories similar to that related. Lord Listowel, one of the founders of the society, states that, while it is impossible to encourage action contrary to the law, the new society has been formed to get the law altered, so that it will be possible to shorten the agony of incurable disease. The society does not think it right that one physician should have the responsibility of such a decision. There should be at least two to decide whether it is impossible for medicine to alleviate suffering.

Some contrary views are expressed. Dr. Estelle Cole, medical psychologist, writes: "When in general practice, I had several cases in which I thought it would have been only humane to end the patient's sufferings. Of course I did not do so and never have heard of any other physician doing so." The *Daily Mail* publishes a cablegram received from Oklahoma City stating that following its disclosures by a physician who had killed five persons suffering from incurable disease a meeting of specialists of international repute was held and united in condemning "mercy killings." The meeting held that no physician had the right to take a patient's life, since there is no way of being certain that a case is incurable.

In a further instalment of the correspondence, a physician writes: "The vast majority of doctors would be opposed to taking life in any circumstances, ignoring the fact that in their secret hearts they know that on rare occasions cases arise when decisions have to be taken on this supreme matter. What they will strongly oppose is any effort to legalize such a course of action, and for this reason. There is only a comparatively small fraction of cases which one can say with certainty are incurable. The employment of passive euthanasia by the use of pain-relieving drugs is a very different thing from active euthanasia —the deliberate taking of life." The vicar and rural dean of Tonbridge, vice president of the Guild of Health, writes: "I feel that doctors cannot be allowed to take the decision on themselves; it would lead to all sorts of complications in the social order."

So far euthanasia has provoked little discussion in the medical press. In the *British Medical Journal* a London practitioner, Mr. Redmond Roche, says that the profession is all out for

"easy dying," but "easy death" is a different matter. It is a claim never made before, and one that he hopes will never be made legal, for physicians to act as executioners. "The claim of this society is against the moral principles of the sanctity of human life. It cuts right across the principles of every school of ethics and the whole hippocratic tradition. It is no part of a physician's duty to decide what is the value of life for his patient, even a life of suffering and apparently hopeless outlook. What is aimed at by this society would eventuate in giving a helping hand to the would-be suicide and allowing sentimentality to overrule our moral and ethical standards." The Roman Catholic press condemns voluntary euthanasia as contrary to religious teaching. Thus it is evident that the movement will have to run the gauntlet of strong opposition from various quarters.

Tragic Fire in a Surgeon's House

London was shocked by the news of the loss of five lives in a fire at a house in Wimpole Street, the second street in importance of the area in the west end, occupied by the medical consultants. The house belonged to Mr. Philip Franklin, an American who has been practicing laryngology in London for some years. The fire broke out at 6:30 a. m. on Sunday while he was away in the country for the week end. All the inmates—his wife, her niece and three servants—perished. They were trapped in their bedrooms on the upper floors when the fire broke out on the ground floor. It was traced to the fusing of an electric cable. It was extinguished by the fire department in forty minutes.

Ambulance Service for Ethiopia

The British Ambulance Service in Ethiopia has organized an expedition which is about to start from London under the direction of a London surgeon, Mr. A. J. M. Melly, who has had considerable experience in Ethiopia. There are five other medical men, of whom one is a Dane. Besides these the unit will consist of three transport officers, six British noncommissioned officers and twenty-four native dressers, who have been recruited from the medical missions in Kenya and Uganda. The project originated some time ago in the formation of a committee that had a personal knowledge of Ethiopia and was appalled at the prospect the Ethiopian troops would have to face when exposed to the destructive effects of the latest engines of war. The expedition is financed by funds raised in England with the cooperation of the British and Scottish Red Cross societies. The estimated cost of maintaining an expedition in the field for three months is $175,000. Of this only $95,000 has been raised as yet. It was decided rather than to wait until all the money was collected to send out as soon as possible a smaller unit. Should the funds be available, the unit now sent out will be duplicated. In order to reduce expenses the members of the unit will travel second class. The Swedish Red Cross Ambulance Service has already sent out two detachments to Ethiopia, including six doctors, of whom two are bacteriologists. A Swedish aviator has placed his own airplane at the service of the mission.

Health Study Tour of the United States

Dr. R. M. F. Picken, professor of preventive medicine in the Welsh National School of Medicine, has been appointed by the Health Organization of the League of Nations as representative of Great Britain on an American study tour. Six countries are represented. Each member represents various interests in the field of preventive medicine. The tour was to begin at Washington November 4 and end in New York December 7. The health services generally of the United States will be discussed. The places visited will include Baltimore, Knoxville, Nashville, St. Louis, Chicago, Cincinnati, Columbus, Detroit, Philadelphia, Boston, Cattaraugus County and New Haven.

Street Accidents to Pedestrians

The total number of persons killed in the streets of London in the forty-three weeks ended October 26 was 893 and the number injured was 48,377. In the past week fourteen pedestrians were killed. Of these eight were over the ages of 55 and five over 69. In the forty-three weeks ended October 19, 262 pedestrians over the age of 55 were killed, 143 between 10 and 55, and 114 under 10. It is evident that the proportion of persons of advanced years and of children killed is much greater than for the intermediate period of life.

PARIS

(From Our Regular Correspondent)

Oct. 25, 1935.

Negative Skin Reactions in the French Army

A large number of individuals develop a primary tuberculosis in adolescence or even later in life, as Troisier, Barety and Nico showed in papers published in 1934 in the *Annales de médecine*. At the July 9 meeting of the Académie de médecine they reported a statistical study of the skin reactions of 132 soldiers in apparent good health, the majority from 20 to 21 years of age. Thirty-three of the 132 (25 per cent) had markedly negative, four had doubtful and fifteen had delayed reactions. Only 60.6 per cent had a positive reaction. Of the 132 soldiers, fifty-seven came from villages of 2,000 or less inhabitants. Twenty-three of the fifty-seven, or 40.4 per cent, had negative, eleven, or 19.2 per cent, had doubtful or delayed, and only twenty-three had positive reactions. For the seventy-five soldiers born in cities, the percentages are nearer those considered typical; viz., fifty-seven (76 per cent) had positive, eight doubtful or delayed and ten negative reactions. In the discussion, Debré emphasized the necessity of a widespread use of the tuberculin skin reaction. Too many physicians take it for granted that it is always positive in older children and adults. Lereboullet stated that, in the children's hospital of Paris, only after the age of 12 years does the positive reaction reach a percentage of 50, and then it rises to 75 at the age of 13 years. Sergent has observed from 18 to 20 per cent of negative reactions in medical students working in his tuberculosis service. The majority of these students came from rural districts and should be carefully watched.

Prevention of Tuberculosis in Medical Students with BCG Vaccine

Scheel of Oslo (Norway) reported his observations from 1926 to June 1935 with the Pirquet and Mantoux tuberculin skin tests on 1,225 students who worked in the tuberculosis wards. The report was read at the July 25 meeting of the Academy of Medicine by Professor Guérin of the Pasteur Institute. The students may be grouped as follows: Group 1 includes 361 students having a positive skin test before and two months after entering the ward service. In this group the positive reaction antedates any possible hospital contamination. Group 2 includes 207 students with negative tests prior to entering the wards. Group 3 includes 295 with negative tests before beginning their service and who had been given the BCG vaccine. Group 4 includes 262 students whose tests were positive two months at least after and also during their entire service in the wards. It is impossible to ascertain whether the positive tests existed before their ward work began. Group 5 includes 100 who had evidences of tuberculous infection before entering the wards. All had positive tests with one exception. For the first four groups not having presented evidences of tuberculosis before their ward work, the occurrence of positive tests shows a gradual rise from the age of 16 (34 per cent) to that of 22 years (54 per cent) and a sudden rise between 22 and 25 years to 72 per cent. The ward work was usually begun at 25.

In the case of the nurses in the tuberculosis wards, the percentage of positive skin tests rises from 50 to 100 during the first three years of their service.

The average annual morbidity (tuberculous) in the different groups was noted in the case of 1,024 students: Group 1 (262 students), students with positive skin test before entering the wards: 1.35 per cent. Group 2 (144 students), negative test before ward work: 4.6 per cent. Group 3 (295 students), negative test before service but given BCG vaccine: 1.95 per cent. Group 4 (237 students), test found positive during ward service without any knowledge as to result of tests before: 2.38 per cent. Group 5 (eighty-six students), with signs of tuberculosis before beginning service: 2.80 per cent. These figures show that the morbidity is higher among students doing work in tuberculosis wards than among the population of Norway in general; hence students working under these conditions must be protected against contracting tuberculosis. Those having negative skin tests show a morbidity three times as high as that shown by those with positive tests. The benefits of BCG vaccination are evident in group 3; the 295 students had negative skin tests on entering the service and were then given the BCG vaccine with a resultant morbidity of only 1.95 per cent.

Of the 355 vaccinations given to those in the third group and to others not in the group, 321 were given subcutaneously, thirty-four by mouth. The initial dose of the latter was 50 mg.

BERLIN

(From Our Regular Correspondent)

Oct. 7, 1935.

Recent Developments at German Universities

Some time ago reference was made to the marked reduction in the number of students studying at German universities. The reduction was much greater than the authorities had anticipated and led soon to the abolition, or at least the toning down, of restrictions. It seems now, from an examination of statistics of German universities, that the reduction has been considerable. For the summer semester of 1932 the total attendance at the German universities was 129,606; for the winter semester of 1934-1935 it was only 86,865, a decrease of about one third. The number of new entrants for the study of medicine dropped from 4,900 for the school year 1931-1932 to about 1,500 for the school year 1933-1934. (Some subjects, however, showed an increase: Catholic theology, training course for teachers in the public schools, agriculture, forestry and mining engineering.) The shifting in the social strata finds expression in the fact that, of the new entrants for the summer semester 1934 a higher percentage of students belong to the classes represented by minor officials, small land owners, peasants and workmen than has ever previously been the case. On the other hand, the percentage of children of middle-rank officials has declined. By reason of the lowered birth rate during the war, it is thought that the next few years will bring a further reduction in the number of students. Not until 1940 is it anticipated that there will be any considerable increase.

By reason of this great reduction in the number of students, the maximal number of students allocated to the various universities has in some instances been increased. The University of Berlin has been allowed 6,900 students in place of 5,600; a number of other universities located in large cities have had their allocation increased. Requests for admission will be considered in the following order: (*a*) "veterans" of the national-socialist party; (*b*) members of the defense forces, provided they are pursuing studies at the command of their military service centers, for later use in the army service, and (*c*) students who have studied at the two eastern universities Königsberg and Breslau (these two universities, as being frontier centers of German thought, are shown some preference). These provisions do not apply to foreigners.

The general aspect of the student body has changed greatly. Characteristic is the official declaration: "Hitler youth and the student body of the universities are the natural supporters of the political struggle of our youth." Especially sharp was the struggle for the preservation of the student "corporations," or corps, which have been for many years a characteristic feature of German universities. A few months ago, this struggle, to which reference has been made in previous letters, was brought to a near close when the League of Corps Students, the so-called Kösener Senioren-Konvent, declared publicly its adherence to national socialism and took the oath of fidelity and loyalty. This occurred in June of this year. On September 25 an order was issued forbidding fuehrer and members of the Security League to belong to a chapter of the Kösener SC "because the Kösener SC has publicly refused to carry out the principle of Aryanism." In other words, no one would be allowed to belong to an SC corps or to a league of alumni composed of former members of a given corps, on pain of dismissal from the Sicherheits-Abteilung.

Soon after publication of this order, developments were rapid. October 1 the Kösener SC was dissolved of its own free will. No doubt this step was taken in anticipation of compulsory orders to be issued by the central government or the ruling party. The upper strata of German society, the nobility, the bureaucracy, big industry and the bench are permeated with former corps students. It is evident that this opposition, which has continued now over two years, was directed primarily against the "upper classes." The bone of contention, however, was the Jewish problem, for several student corps had steadily refused to eject their non-Aryan members. Pure-blood Jews were seldom involved but rather offspring of mixed marriages. Now that the Kösener SC has been overthrown, the individual student corps at the universities will have rough sledding. In fact, some universities have suspended the student corps. From the standpoint of the present government one can understand that the student corps were a thorn in the flesh. It might be recognized that they brought out many good qualities in their members, yet their esprit gave rise to many things that were not so desirable; for example, their exaggerated exclusiveness, by reason of which an old corps student would often assist a corps brother along the path of life irrespective of whether or not he was deserving of aid. The result of this overemphasis on "connections" has sometimes been that good positions have not gone to the "worthiest and best" but rather to corps brothers. The more serious members of the SC league have often observed and regretted this fact. On the whole, it must be admitted that the class pride displayed by some of the corps students was exaggerated and objectionable. With this league there has disappeared an eighty-year-old tradition, which had accomplished much in the way of character building and had contributed a great deal toward the development of a spirit of camaraderie.

A few days after the dissolution of the Kösener SC, the other large student league, the "Deutsche Burschenschaft," followed suit. In contrast with the student corps, however, whose views formed a sharper contrast with those of the national socialists, the burschenschaften have acquiesced submissively and have thereby turned their backs on their liberal past. Their 110 chapters have been united with the Nationalsozialistischer Studentenbund. The bright cap and other insignia of the burschenschaften, which have helped to give a colorful aspect to the German universities, will disappear. Ever since the World War the burschenschaften have shown a tendency to sacrifice their traditions of a hundred years ago, when they were leaders in their support of liberal democratic ideas, and to embrace the newer ideas of the national socialists. It is evident that the leveling process is making rapid headway in the fraternity life of German university students.

The federal minister of public instruction has issued new regulations concerning the admission of students to the "Reichsschaft der Studierenden an den deutschen Hoch- und Fachschulen." Without exception, only such students may be admitted to local student bodies as "can prove, in accordance with the regulations of the national-socialist party, that they are of Aryan origin and of true German stock. . . . In case of doubt, documentary evidence back to the year 1800 may be demanded." An official announcement has been published to the effect that "the decree constitutes another forward step in the application of the principle of Aryanism."

Of the 91,480 German students (exclusive of foreigners) attending German universities during the summer semester of 1934 (the last semester for which complete statistics are available) 656, or about 0.71 per cent, were of the Jewish faith. In addition there was a group of non-Aryans who cannot be identified on the basis of statements as to their religious faith but who are known from the fact that they are not admitted to the German student body. The total number of non-Aryans (exclusive of foreigners but including the pure-blood Jews) is 1,316, or 1.44 per cent of the total number of students of German citizenship. Hence it may be concluded that there are twice as many students of Jewish race as there are open adherents of the Jewish faith. In the summer semester of 1934 there were only twenty-four Jews among the first-semester entrants out of a total of 6,189 (excluding foreigners). Of the 4,350 foreign students, 364 were found to be of the Jewish faith; of this number, 208 were studying medicine or dentistry.

New regulations pertaining to examinations given non-Aryan medical students have likewise been announced. If these began their studies before the summer semester of 1933, they will be admitted to examinations in the scheduled manner. But passing of their examinations does not entitle them to a license to practice. If, however, they began their study of medicine or dentistry in the summer semester of 1933, they can be admitted to examinations "only in exceptional cases" and that only with the special consent of the minister of the interior. Foreigners will be admitted to the examinations without being obliged to furnish evidence of Aryan origin. The following citation from the regulations is revealing: "The licensure (the right to practice medicine or dentistry) will not be granted to non-Aryan physicians or dentists until further notice. Only in a few exceptional cases, which must be presented to the minister for his decision, will a license to practice be granted. An exception will usually be made if the candidate fought at the front in the World War, or if only one of his four grandparents was Jewish (thus having only a quarter Jewish blood), or if his bearing and appearance are unobjectionable."

ITALY

(From Our Regular Correspondent)

Sept. 30, 1935.

Society of Anesthesia and Analgesia

The Società di anestesia e analgesia held recently its first meeting at Turin, jointly with the Società Piemontese di chirurgia, in which many foreign physicians participated. Papers were presented that dealt with the use of carbon dioxide in surgery. According to Bogetti, the administration of carbon dioxide during anesthesia suppresses the initial state of excitement and in addition increases the depth of inspiration and prevents respiratory syncope. It combats also hypotension and inhibits nausea and vomiting.

Peracino reported the results secured in the Ospedale Mauriziano in Turin, over a period of three years, from the administration of carbon dioxide during and after anesthesia. It has always aided the respiration during anesthesia. The reawakening is more rapid and is without nausea or vomiting.

Coronedi pointed out that, following acute poisoning due to barbituric compounds, grave symptoms involving the bronchopulmonary apparatus are observed. This is due to the fact that, because of the intoxication, the respiratory movements are extremely limited. The inhalation of carbon dioxide-oxygen mixture is an excellent prophylactic means and an auxiliary remedy in combating intoxications of this nature.

Another series of papers dealt with the treatment of pain. Foa pointed out that ultraviolet irradiation with long waves has an immediate but not an enduring action, whereas ultraviolet irradiation with short waves gives more permanent results. In some cases the application of roentgen rays, he has observed, effects a cure of neuralgic disorders, which is permanent in about 60 per cent of the cases.

Segre spoke on posttraumatic spinal algias, emphasizing the importance of a thorough radiologic examination. In cases that he treated he brought about a permanent cure of peripheral algias by means of subarachnoid alcoholization of the posterior roots, thereby blocking the central nerve paths that transmitted the pain sensation.

Trueta of Barcelona discussed splanchnic anesthesia, which he used in interventions on the stomach, combined with local anesthesia applied to the stomach wall. In 771 cases he obtained excellent results, securing absolute anesthesia in 96 per cent. The number of complications in the form of bronchial pneumonia was reduced two thirds, as compared with the number recorded for ether anesthesia.

Giordanengo reported that in the surgical clinic at Bern, during the previous twenty years, in goiter operations local anesthesia was applied to the subcutaneous tissues and to the superficial cervical plexus by means of very dilute anesthetic solutions. With this method one avoids the blocking of the vagus and the recurrent nerves, together with the consequent complications.

Giorelli discussed the problem of anesthesia as applied to dentin, and pointed out that all the preparations that produce insensibility in dentin exert a destructive action on the tooth pulp, as was demonstrated in a number of photomicrographs that he presented, which revealed changes in the tooth pulp due to the application of anesthetic substances to the surrounding dentin.

Roccia spoke on infection as a complication of local anesthesia in stomatology. He holds that in the majority of such cases the local infective process is due to the introduction of bacteria with the needle, during the injection. Local anesthesia has no drawbacks if its use is confined to inflammatory processes without suppuration, but it should not be used in the treatment of purulent foci. It exerts a harmful action on the defense mechanism of the tissues.

According to Ruspa, local anesthesia and nerve blocking supply the deficiencies of all the systems of dentin and pulp anesthesia and give excellent results also in devitalization of the teeth.

Pejrone explained the technic of anesthetic injections in dental medicine and emphasized the importance of the degree of pressure applied in injecting the fluid, and the temperature of the fluid injected.

Kirschner of Heidelberg illustrated, in a film, his method of spinal girdle anesthesia induced by means of air. He injects into the dural sac a certain quantity of air, a total of about 22 cc., and an anesthetic solution that has the properties of being lighter than the spinal fluid and of not becoming readily diffused. Several different strata are formed; in the lowest strata is the spinal fluid, in a second strata above is the anesthetic, and above that is a strata of air. By regulating suitably the position of the zone with the anesthetic, the zone of insensibility can be shifted at will. Three thousand cases have demonstrated the value and the advantages of the method.

Figueras of Barcelona uses epidural anesthesia, employing procaine with epinephrine. He secures complete anesthesia in about 85 per cent of the cases, without grave incidents. He

recommends the method especially for interventions on the kidney and on the biliary tracts.

Pescarmona secured good results with nupercaine in 500 cases of spinal anesthesia, with rare and transitory untoward incidents. It is necessary, however, to establish the exact indications, to prepare the patient carefully for the anesthetic, and to apply the exact technic of spinal anesthesia.

Ceremonies in Memory of Francesco Folli

Physicians from nineteen countries met recently at Poppi (Arezzo province) to honor the memory of Dr. Francesco Folli, who was the first to employ blood transfusion. Born at Poppi in 1624, this learned physician, in his publications "Recreatio physica" (1665) and "Dialogo sulla cultura delle vite" (1670) explained his idea of transfusing the blood of young and healthy persons to old or sick persons and described the instruments needed for the intervention.

The commemorative address was delivered by Professor Pazzini of the University of Rome.

Professor Cerletti Called to the University of Rome

The faculty of medicine of the University of Rome has asked Prof. Ugo Cerletti, formerly director of the university clinic in Genoa, to accept the chair of nervous and mental diseases at the University of Rome. After finishing his course of training in Rome, Cerletti continued his studies in German and French clinics. His works on the diseases of the cerebral blood vessels and of the meninges, and on the lesions of the cells and of the nerve fibers, are original in thought and classic in mode of expression. His new conception of the structure of the neuroglia, which has been accepted by many leading authorities, changes radically the old conception of Weigert.

BUDAPEST

(From Our Regular Correspondent)

Oct. 18, 1935.

The Ninth International Dermatologic Congress

Prof. Louis Nékám of Budapest University, president of the ninth International Dermatologic Congress, opened the congress in the parliament building in Budapest. The Hungarian parliament reaches back to the beginning of the eleventh century. The foundation of the capital city took place, under the name of Aquincum, almost 2,000 years ago. Our scientific academy as at present organized dates back 110 years and our university 300 years. He said that the task of our congress is to further dermatology. Development in dermatology proceeds in the form of waves every fifty to sixty years. In the last 150 years three such waves have passed and the fourth is now under way. The approximate date of the first one was 1780, of the second 1835, and of the third 1880. In the first wave, two thoughts awakened the stagnating dermatologists. One of them carried the names of Plenck of Budapest, Lorry of Paris and Willian of London, who first emphasized the importance of pathologic symptoms and demanded the thorough examination of the patient. The second thought was presented in the method of Hunter, who said that in case of doubt one should appeal to experiments.

The second wave began 100 years ago. In 1834 Renucci demonstrated the mite of scabies; it was then discovered by Bassi and Balsamo that fungi are capable of killing the silkworm. In 1835 appeared Alibert's great monograph and Rayner's manual on the diseases of the skin. Dermatologic knowledge advanced to such an extent that Cazenave thought of editing a dermatologic magazine. During this time the question was not "what?" but "why?" Dermatologists saw the changes and wanted to know their causes. One after the other entered the arena, the Frenchman Bichat, the Austrian Rokitansky, the German Virchow and the Italian Morgagni. Gradually scientific morphology evolved. Every day new discoveries were made. People saw with amazement what immense importance attaches to the most minute living things. Conditions a hundred years ago must have been very primitive. When Hebra took over his hospital section in 1844, 2,173 of his 2,723 cases were diagnosed scabies. But could it be otherwise? Nothing was yet known about the function of the spleen, bone marrow, lymph glands, internal glands, sympathetic nerves or the reticulo-endothelial system. The present laboratory tests had not been discovered. Today every assistant is making analyses with much more exact results than did Laënnec and Skoda.

In the year 1880 came the third wave—bacteriology. Pasteur and Koch founded many new conceptions, such as virulence, vaccination and immunity. Hand in hand with this went in the next fifteen or twenty years recognition of the fact that, besides the etiologic agent, the attacked organism itself is an important determining factor of the pathologic process, and that its reaction or counter attack was also of great influence.

With this a new age was reached in which it appeared that there are still much tinier things than bacteria, than the ultramicroscopic beings; these are emanations and rays, which may attack the organism. In this age protection against diseases will be reached not by isolation or quarantine but by training, panimmunity and insusceptibility. Of course this requires a higher realization of the ideals of medical sciences. These perspectives have been a guide in preparing the program of the congress. The most important questions were considered: the correlation of functions, the filtrable viruses, the disturbances of metabolism, heredity, tuberculosis, venereal diseases, lepra, lymphogranulomatosis, industrial diseases and cancer. These were chosen to be dealt with from the scientific point of view and discussed also at separate conferences from the social and hygienic points of view. Besides special committees were organized which should endeavor to make terminology systematic and to frame definitions and basal conceptions. In 1896 Hutchinson said that it would be the greatest blessing if terminology and classification might be improved and that the start had to be made by dermatology. "Names are good servants but bad masters," he said.

Committees were named to deal with the training of dermatologists and with the discussion of the ethical, technical and economical conditions of dermatologic practice. The reports of these committees will appear in a separate volume. Many instructive preparations, historical exhibits, the results of research and technical instruments were shown.

JAPAN

(From Our Regular Correspondent)

Oct. 10, 1935.

The Average Size of Japanese Students

About thirty years ago the height of schoolboys at the age of 7 was 107 cm. and of schoolgirls 105.8 cm.; at present the corresponding measurements are 108.5 and 107 cm. At the age of 13, when they finish the six years course of the primary school, the height of the boys was 133.6 cm. thirty years ago and of the girls 133.6 cm., the corresponding measurements now are 137.1 and 138.5 cm. This shows that girls grow taller than boys during these years by 1.5 cm. on an average. At the age of 21, when they usually enter the university, boys were 160.7 cm. in height but now are 163 cm.; that is, they become about 55 cm. taller than they were at the age of 7. When the girls are about 19 years old they were 147.5 cm. in height but at present are 131.2 cm. They are shorter than boys by 12.5 cm. but they become 44 cm. taller than they were at the age of 7. According to their respective ages, the boys grew 3.9 cm. every year on an average, and they have their best yearly growth of 3.6 cm. to 8.5 cm. at the age of 14 or 15. With the girls the average increase of height is 3.67 cm. and the

best growth is seen when they are 13 or 14 years old, the average increase being 5.3 cm. to 5.8 cm. As for their weight and the circumference of the chest, almost the same tendency is observed. The average increase of the weight of boys during their school life is between 36.2 and 37.3 Kg.; of the girls, between 27.9 and 28.8 Kg. The girth of boys increases by 27.9 to 28.8 cm.; of the girls, between 24.4 and 25.6 cm. Boys in the first year class in modern primary schools are heavier than the former boys by 0.5 Kg. and the girls by 0.4 Kg. As for the girth of the chest, the boys have an increase of 0.5 cm. but a decrease is found in the girls.

The Board of Medical Inspectors

The Board of Medical Inspectors met September 19 at the bureau of education, to discuss the problem of how to support private medical educational institutions. The inspectors required that the bureau of education grant these institutions financial assistance. The regular examination made by the inspectors is reported as having brought good results. Another subject discussed was a medical course to be opened for foreign students to this country. There are many Chinese, Filipinos and Siamese who want to finish their medical training in Japan within a comparatively short time. The board agreed that the new course should be satisfactorily adapted to the needs of students who come from foreign countries. There should be two years' preparatory study, chiefly for training in the language, and after that four years of medical training. The six year course is expected to be established by some private medical colleges, as the government medical colleges are not authorized to receive foreign students as regular students. At the same time, Manchukuo is in urgent need of more practitioners in the interior of the country. Unfortunately Manchukuo does not have a medical school but must send students to Japan to be educated. Those two needs are to be met by private schools. Another subject discussed was the amalgamation of some medical schools that are in financial difficulties. This is of course desirable, but most of the medical men concerned do not desire amalgamation.

The Health of High School Students

After a year's investigation, a report on the health of the pupils of the middle grade schools was issued by the sanitary section of the educational department. These schools are attended by boys and girls from 14 to 18 years of age. In 1934, of a total of 736,500 pupils, 2,092 died, 3,766 were obliged to leave school on account of sickness, 9,734 were compelled to stay away from school a long time through sickness, and 47,884 were absent from school for more than a week on account of sickness. The sickness for the most part was tuberculosis. One of the main causes of so much tuberculosis must be competitive examinations. Even the children in the primary schools are forced to prepare themselves in order to enter any good schools. The lack of proper sanitation in the schools must also be a cause and is due to the poverty of the local government. Private bodies of various kinds, such as the parents' association in the primary schools, are organized to provide needed equipment.

Personals

Prof. Dr. N. Hayashi, famous for his lifelong devotion to research on tsutsugamushi disease, has closed his research laboratory in the prefecture of Niigata, where he has rendered such great services in prevention of the disease. The mayor of Nagaoka held a farewell meeting in his honor and decided to give a subsidy of 1,500 yen a year to have his research continued at Nagoya.

Dr. Yutaka Tateki has been appointed chief professor of the Nagasaki medical college, to succeed the late Prof. Dr. Komuro.

In the general election of members of the prefectural assemblies, held in the latter part of September throughout the country, 126 medical men were candidates and sixty-six were elected. This fact shows that medical men are much interested in the politics of the local government and are leaders in their own districts.

Marriages

JOHN E. HARTSAW, Cristobal, C. Z., to Miss Hannah Washington of Guayaquil, Ecuador, at Balboa, October 16.

IRMA CARLENS HENDERSON to Mr. William E. Smathers, both of Asheville, N. C., at Hendersonville, November 3.

JOHN M. BRAND, Spencer, W. Va., to Miss Mary Colebank of Morgantown, in Huntington, November 2.

SAMUEL BUTLER GRIMES, Baltimore, to Miss Elizabeth Brawner of Washington, D. C., October 19.

DONALD C. WILKINSON, Oconomowoc, Wis., to Miss Ruth Halloran of Des Moines, Iowa, October 12.

ADOLPH E. DREXEL, Palatka, Fla., to Miss Charlotte Leah Shipps of Wilkes-Barre, Pa., November 6.

PAUL D. MCCARTY, Ely, Minn., to Mme. Delphine Sames-Schacht of Virginia, in Chicago, recently.

HERMAN HARRISON BRAXTON, Chase City, Va., to Miss Ann Norfolk Grimm of Baltimore recently.

MARTIN CARL LINDMAN, Rockford, Ill., to Miss Alice Dorothy Port of Youngstown, Ohio, March 31.

SAMUEL LINN GROSSMAN, Harrisburg, Pa., to Miss Mary Quinn of Bayonne, N. J., October 19.

WILLIAM B. BURLESON to Miss Amanda Elizabeth Godfrey, both of Plumtree, N. C., August 29.

FRANK KELLS BOLAND JR. to Miss Octavia Norfleet Riley, both of Atlanta, Ga., November 14.

JAMES J. GWIN, Hartsville, Tenn., to Miss Elsie Evins of Culleoka, at Carthage, October 18.

JACOB JOSEPH SILVERMAN, Staten Island, N. Y., to Miss Myn Reich of Orange, N. J., October 3.

FRANK KARSTENS DEAN, Madison, Wis., to Miss Gladys Paust of Columbus, September 30.

EDGAR MARVIN LANCASTER, Shady Dale, Ga., to Miss Jewel Moats of Fairburn, September 14.

FRANK E. DREW, Milwaukee, to Miss Irene Wollaeger, at Pine Lake, Wis., September 7.

WILLIAM D. BURKHALTER to Miss Alice Novella Graves, both of Nashville, Tenn., October 3.

CLIFFORD O. MCCREEDY, Aledo, Ill., to Miss Permelia Donaldson of Monmouth, October 24.

BENJAMIN HALPORN, Oberlin, Pa., to DR. MIRIAM REWALT POLK of Harrisburg, July 11.

HENRY KIRVIN SPEED JR., Sayre, Okla., to Miss Ruth Armstrong of Norman, recently.

ARTHUR J. ROSER, Arcola, Ind., to Miss Lillian Kluger of Indianapolis, September 8.

NORRIS EDWARD LENAHAN to Miss Ernestine Little, both of Columbus, Ohio, recently.

ARMER H. STOLPESTAD, St. Paul, to Miss Evelyn K. Gordon of Minneapolis recently.

WILLIAM H. ROE, Patchogue, N. Y., to Miss Alice Ongaro of Astoria, September 7.

GLENN R. STAUFF, Green Bay, Wis., to Miss Mildred Witters of Hilbert, October 11.

DAVID E. MARKSON to Miss Esther N. Anderson, both of Chicago, October 12.

MARTIN G. ERICSSON to Miss Martha E. Anderson, both of Chicago, October 26.

THOMAS C. GUTHRIE, Smithville, Ark., to Mrs. Ora Ashburn of Imboden recently.

CHARLES A. EBERHART, Atlanta, to Miss Avis Barr of Bowdon, Ga., August 31.

JAMES H. CARSON, Martins Ferry, Ohio, to Miss Esther Horswell recently.

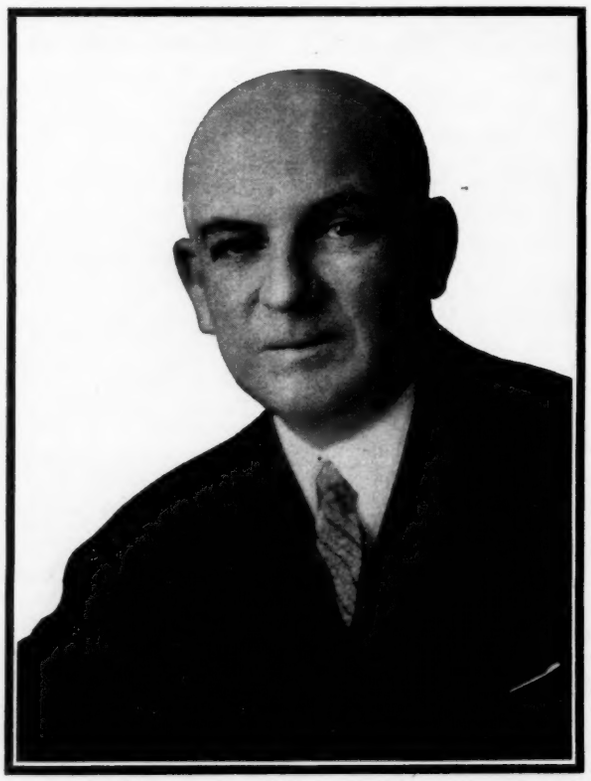
GEORGE W. JOHN to Miss Pauline F. Poudrier, both of Beloit, Wis., October 15.

DAVID H. SMELTZER, Youngstown, Ohio, to Miss Florence Buehrle recently.

PAUL J. LEAHY, Tiffin, Ohio, to Miss Mary Quinn of Erie, Pa., recently.

Deaths

Edward Starr Judd ✠ Rochester, Minn., President of the American Medical Association in 1931-1932, died of pneumonia, after a few days' illness, in the Presbyterian Hospital, Chicago, November 29. Dr. Judd was on his way to address a meeting in Philadelphia when he was taken ill. Born in Rochester, Minn., July 11, 1878, he graduated from the University of Minnesota School of Medicine, Minneapolis, in 1902 and then became an intern in St. Mary's Hospital in Rochester. In 1903 Dr. Judd became first assistant to Dr. Charles H. Mayo, and in 1904 he was appointed head of a section in the division of surgery at the Mayo Clinic; later he was appointed surgeon at St. Mary's Hospital in Rochester and professor of surgery in the graduate school of the University of Minnesota, positions which he has filled with distinction for many years. Dr. Judd served during the World War as director of the school of instruction for officers and enlisted men of the medical corps in Rochester. Since the war at times he had given of his talent and experience in the training of medical reserve officers. He contributed much to the advance of surgery, having long been recognized as a foremost leader and teacher, especially in surgery of the abdomen. Attesting his great work and ability are his numerous scientific articles in the periodical medical literature and textbooks, numbering more than 200. One of the latest papers was published in THE JOURNAL, November 23. Dr. Judd was a favorite lecturer and traveled thousands of miles during his career to address medical groups and societies. He was from the beginning of his career an indefatigable worker in organized medicine in county, state and national medical societies. He served as president of the Minnesota State Medical Association; was secretary of the section on surgery, 1913-1916, and chairman, 1917-1918, and in 1918 was elected second vice president of the American Medical Association. He was also a member of the Council on Scientific Assembly of the American Medical Association from the time it was created in 1915 until the conclusion of the annual meeting in Washington, D. C., in 1927. While President-Elect he was chosen to give the first address of the Mayo Lectureship in Surgery at Northwestern University Medical School in Chicago in April 1931, a lectureship that was endowed by Dr. Charles H. Mayo for the advancement of learning in surgery. Dr. Judd was a member of the Minnesota Academy of Medicine, the Minnesota Pathological Society, the Western, Southern and Interurban surgical associations, the American College of Surgeons, the Clinical Surgical Association, the Southern Minnesota Medical Association, the Association of Resident and Ex-Resident Physicians of the Mayo Clinic, Sigma Xi, and an honorary member of several scientific societies of foreign countries. Dr. Judd was married to Miss Helen Berkman of Rochester in 1908. Among his five children is a son who is a senior at Rush Medical College. Surgeons everywhere have spoken of the surgical mastery of E. Starr Judd, calling him a surgeon's surgeon and the greatest of the great. Men came from the four corners of the world to witness him at his routine work. He was modest, sincere and earnest—a man with beauty of character and greatness of spirit. His death fell on those who knew him like an overwhelming blow.



EDWARD STARR JUDD, M.D., 1878-1935

George Elgie Brown ✠ Rochester, Minn.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1909; associate professor of medicine, Mayo Foundation, University of Minnesota Graduate School of Medicine; in 1921 came to the Mayo Clinic as first assistant in one of the sections in the division of medicine and was appointed associate in 1922; served with the Rockefeller Foundation in France in 1918 and 1919; member of the Central Society of Clinical Research and the American Society for Clinical Investigation; fellow and formerly regent of the American College of Physicians; consulting physician and head of a section on medicine of the Mayo Clinic; author of numerous articles; aged 50; died, November 28, of pneumonia.

Henry Joseph Fitzsimmons, Boston; Harvard University Medical School, Boston, 1908; member of the Massachusetts Medical Society; fellow of the American College of Surgeons; instructor in orthopedic surgery at his alma mater; assistant surgeon to the Children's Hospital, associate orthopedic surgeon to the Newton (Mass.) Hospital, orthopedic surgeon to the St. Mary's Infant Asylum and Hospital; consulting orthopedic surgeon to the Quincy (Mass.) Hospital, the Providence Hospital, Holyoke, and the Choate Memorial Hospital, Woburn; aged 55; died, October 5, of arteriosclerosis.

Charles Thaddeus Souther, Cincinnati; Medical College of Ohio, Cincinnati, 1902; member of the Ohio State Medical Association and the Western Surgical Association; fellow of the American College of Surgeons; past president of the Cincinnati Academy of Medicine; served during the World War; aged 59; president of the staff of St. Mary's Hospital; on the staffs of the Bethesda Hospital and the Deaconess Hospital, where he died, October 11.

Ralph Gates Cressman ✠ Stockton, Calif.; Bennett College of Eclectic Medicine and Surgery, Chicago, 1905; served during the World War; at one time medical examiner for the United States Veterans' Bureau; aged 55; died suddenly, October 18, in St. Joseph's Hospital, of ulcer of the stomach with perforation and carcinoma of the pancreas.

Waller Hunn Nardin ✠ Anderson, S. C.; New York University Medical College, 1897; fellow of the American College of Surgeons; past president of the Anderson County Medical Society; formerly member of the school board and city council; on the staff of the Anderson County Hospital; aged 59; died, October 7, of coronary thrombosis.

William A. Ferguson, Moncton, N. B., Canada; McGill University Faculty of Medicine, Montreal, Que., 1884; past president of the Council of Physicians and Surgeons of New Brunswick; fellow of the American College of Surgeons; for many years on the staff of the Moncton General Hospital; aged 74; died, October 2, of pneumonia.

Herbert Arthur Breyfogle, Kansas City, Mo.; Rush Medical College, Chicago, 1905; member of the Missouri State Medical Association; served during the World War; at one time member of the state board of health; on the staff of St. Luke's Hospital; aged 57; died, October 11, of coronary sclerosis.

Charles Jefferson Simmons ✠ Lawrence, Kan.; Bellevue Hospital Medical College, New York, 1885; formerly lecturer on principles of surgery and adjunct professor of general surgery, University of Kansas School of Medicine; aged 77; died, October 20, of peritonitis following a ruptured appendix.

George Marven Cady ✠ Owego, N. Y.; University of the City of New York Medical Department, 1887; since 1891 trustee and since 1920 on the staff of the Robert Packer Hospital, Sayre, Pa.; since 1921 member of the board of visitors of the Elmira Reformatory; aged 70; died, October 10.

Thaddeus Louis Szlapka, Shorewood, Wis.; University of Pennsylvania Department of Medicine, Philadelphia, 1914; served during the World War; formerly assistant clinical professor of medicine, Marquette University School of Medicine; aged 44; died, September 29, of pneumonia.

Jethra Hancock, Louisville, Ky.; Hospital College of Medicine, Louisville, 1905; member of the Kentucky State Medical Association; served during the World War; director of the bureau of venereal diseases, state board of health; aged 60; died, October 4.

Charles George Koehler, Brooklyn; College of Physicians and Surgeons, Medical Department of Columbia College, New York, 1882; member of the Medical Society of the State of New York; aged 77; died, October 30, of chronic myocarditis and bronchitis.

Frank Albert Phillips, Pasadena, Calif.; Bennett College of Eclectic Medicine and Surgery, Chicago, 1886; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1891; aged 69; died, September 10, of tuberculosis.

Nathan M. Friedman, Boston; Medizinische Fakultät der Albertus-Universitat, Königsberg, Prussia, 1906; Tufts College Medical School, Boston, 1909; member of the Massachusetts Medical Society; aged 51; died, October 3, of carcinoma of the right lung.

Albert Durham, Tuxedo, N. C.; University of the City of New York Medical Department, 1891; served during the World War; for many years on the staff of the Bloomingdale Hospital, White Plains, N. Y.; aged 71; died, October 27, of heart disease.

Philip Reginald Fox ✠ Madison, Wis.; Rush Medical College, Chicago, 1890; fellow of the American College of Surgeons; on the staffs of St. Mary's and Madison General hospitals; aged 68; died, October 2, of carcinoma of the rectum.

Frank Llewellyn Durgin, Winnebago, Minn.; Western Reserve University Medical Department, Cleveland, 1882; member of the Minnesota State Medical Association; aged 83; died, September 23, of chronic myocarditis and arteriosclerosis.

Julius Morris Abelio, Los Angeles; College of Physicians and Surgeons of Chicago, 1892; formerly on the staff of the Mount Sinai Hospital, Chicago; aged 72; died, November 8, in the Cedars of Lebanon Hospital, of bronchopneumonia.

Francis John Higgins ✠ East Providence, R. I.; Tufts College Medical School, Boston, 1921; on the staffs of St. Joseph's Hospital and the Homeopathic Hospital, Providence; aged 41; died, October 3, of cerebral hemorrhage.

John F. Hargan, Mound City, Ill.; University of Louisville (Ky.) Medical Department, 1891; member of the Illinois State Medical Society; aged 71; died, September 29, in St. Mary's Infirmary, Cairo, of cerebral hemorrhage.

William J. Gundelach ✠ St. Louis; Washington University School of Medicine, 1890; University of Pennsylvania Department of Medicine, Philadelphia, 1891; aged 67; died, September 29, of chronic interstitial nephritis.

Harry Kepler Gorsuch, Baltimore; College of Physicians and Surgeons, Baltimore, 1889; member of the Medical Chirurgical Faculty of Maryland; for many years city coroner; aged 66; died, October 9, of angina pectoris.

William Hampton Matchett, Greenville, Ohio; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1899; aged 58; died, October 3, in the Greenville Hospital, of chronic nephritis and hypertension.

Hazleton H. Stallard, Pikeville, Ky.; Columbus Medical College, 1890; member of the Kentucky State Medical Association; aged 70; died, September 24, in the Methodist Hospital, of diabetic gangrene.

Frank Gale Renshaw, Pensacola, Fla.; University of Louisiana Medical Department, New Orleans, 1879; member of the Florida Medical Association; aged 79; died, September 11, of acute leukemia.

Adolph Herman Nahman ✠ San Francisco; Northwestern University Medical School, Chicago, 1909; fellow of the American College of Physicians; aged 58; died, September 21, of spongioblastoma.

Jacob B. Spangler, Mechanicsburg, Pa.; Jefferson Medical College of Philadelphia, 1886; member of the Medical Society of the State of Pennsylvania; aged 72; died, October 7, of arteriosclerosis.

Leonida Olivieri, Stockton, Calif.; Regia Università di Genova degli studi Facoltà di Medicina e Chirurgia, Italy, 1884; aged 73; died, September 10, in St. Joseph's Hospital, of arteriosclerosis.

Charles J. Fazenbaker, Western Port, Md.; National Normal University College of Medicine, Lebanon, Ohio, 1896; aged 68; died, September 22, near Laurel, Md., of chronic myocarditis and epilepsy.

George White Griswold, Alma Center, Wis.; Milwaukee Medical College, 1910; served during the World War; aged 49; died, September 17, of angina pectoris, arteriosclerosis and pyelitis.

Ward Irving Huber, East Cleveland, Ohio; Western Reserve University Medical Department, Cleveland, 1912; aged 51; died, October 3, of chronic nephritis, myocarditis and pneumonia.

Frèd Xenophon Lilly, Jumping Branch, W. Va.; University of Louisville (Ky.) Medical Department, 1910; aged 49; was killed, September 21, when he was struck by an automobile.

Willard Daniel Arnold, Spokane, Wash.; Rush Medical College, Chicago, 1895; member of the Illinois State Medical Society; aged 63; died, September 17, of cerebral hemorrhage.

Morton Harley Lee, Bearden, Tenn.; Southern Medical College, Atlanta, 1889; past president of the Knox County Medical Society; aged 79; died, October 3, of angina pectoris.

James Henry Barry, Boston; Tufts College Medical School, Boston, 1896; member of the Massachusetts Medical Society; aged 65; died, September 23, of arteriosclerotic heart disease.

Susan Sharpe Waddell, Tsinan, Shantung, China; University of Pittsburgh School of Medicine, 1919; medical missionary; aged 40; was killed, October 15, presumably by bandits.

Arthur Humphrey Wood, Providence, R. I.; New York Homeopathic Medical College and Hospital, 1889; aged 74; died, September 28, of angina pectoris, and arteriosclerosis.

John Lavell Reeve, Lake Nebagamon, Wis.; Queen's University Faculty of Medicine, Kingston, Ont., Canada, 1882; aged 74; died, August 15, of myocarditis and coronary sclerosis.

William Wallace Carleton, Waterloo, N. Y.; University of Buffalo School of Medicine, 1901; served during the World War; aged 56; died, October 15, of coronary thrombosis.

Samuel Floersheim ✠ Los Angeles; Bellevue Hospital Medical College, New York, 1898; aged 58; died, October 4, in the California Hospital, of ruptured ulcer of the sigmoid.

Joseph Edward Clagett, Hamilton, Va.; Maryland Medical College, Baltimore, 1910; member of the Medical Society of Virginia; aged 55; died, October 26, of angina pectoris.

Duncan Aeneas MacGregor, Barry's Bay, Ont., Canada; University of Bishop College Faculty of Medicine, Montreal, Que., 1904; aged 58; died, October 15, of septicemia.

Howard Roeder Swayne, Pittsburgh; Jefferson Medical College of Philadelphia, 1889; aged 72; died, September 29, in the Mercy Hospital, of chronic cardiovascular disease.

Robert Scott Dinsmore, Walla Walla, Wash.; College of Physicians and Surgeons, Keokuk, Iowa, 1878; aged 81; died, August 28, of coronary sclerosis and angina pectoris.

Bransen Kemper De Voe, Albany, N. Y.; Albany Medical College, 1904; member of the Medical Society of the State of New York; aged 63; died, October 3, of myocarditis.

Tillman Wesley Gee, Philadelphia; University of Pennsylvania School of Medicine, Philadelphia, 1932; aged 30; died, October 9, of hypertensive cardiovascular disease.

Albert Edward Patterson, Plymouth, Mich.; Detroit College of Medicine, 1901; served during the World War; aged 65; died, September 13, of cerebral hemorrhage.

Howard Messenger Shaw, Ashland, Ore.; McGill University Faculty of Medicine, Montreal Que., 1895; aged 64; died, September 12, of carcinoma of the lung.

Thomas Frederick Madden ✠ Fresno, Calif.; Cooper Medical College, San Francisco, 1904; aged 55; died, September 8, of streptococcic cellulitis of the face.

James Robert Lockhart, Sherard, Miss.; University of Nashville (Tenn.) Medical Department, 1899; aged 63; died, October 5, of carcinoma of the stomach.

Ella Welch, Ashley, Ohio; Toledo Medical College, 1894; for many years member of the county board of health; aged 72; died, September 23, of arteriosclerosis.

Charles William Stolzer, New Albany, Ind.; Central College of Physicians and Surgeons, Indianapolis, 1904; aged 73; died, October 14, of arteriosclerosis.

Paul F. Deford, Pasadena, Calif.; University of Maryland School of Medicine, Baltimore, 1889; aged 67; died, September 21, of coronary sclerosis.

John Lemuel Thornton ✠ Warrenton, Va.; Jefferson Medical College of Philadelphia, 1924; aged 40; died, October 7, of pulmonary tuberculosis.

M. Hugo Rosenheimer, Milwaukee; Milwaukee Medical College, 1908; aged 50; died, September 29, in Rochester, Minn., of hypertension and uremia.

Correspondence

THE COMMITTEE AGAINST INFANTILE PARALYSIS AND THE GEORGIA WARM SPRINGS FOUNDATION

To the Editor:—In its simplest definition, the Georgia Warm Springs Foundation, Inc., is an organization engaged in "fighting infantile paralysis" in the United States.

Any comprehensive campaign directed to the problems created by this disease is naturally divided into three main subdivisions; namely, (1) research toward successful methods of prevention of and immunization against infantile paralysis; (2) after-treatment, to do everything possible to raise the general standard of methods and facilities used in the after-treatment of infantile paralysis for those who have been left with muscle impairment or deformities, following the acute stage, and (3) rehabilitation and employment. Supplementing and following the work of the orthopedic surgeons and hospitals in bringing about whatever physical restoration is possible, there comes the vital problem of giving to those with a residual handicap such specialized education and training as will enable them to hold a useful place in life and to become economically independent.

Of equal importance is the problem of educating those who employ large numbers of persons to the philosophy of giving an equal opportunity, in appropriate occupations and without prejudice or favoritism, to those who have visible handicaps (orthopedic cripples). It has been proved repeatedly that a physical disability is a minor matter whenever there is real ability, and yet there is all too often an almost automatic ruling out of consideration of persons who use crutches or braces. It has not been sufficiently brought home just what modern transportation does to open the door of opportunity to the crippled workman or executive in the present age, as contrasted to what the disability might have meant 100 years ago. A self-respecting person with the crippling handicap asks or wants no pity. A crippled person is in exactly the same position as a golfer who has to accept a handicap to play in a foursome. It may even make the game of life more interesting, as indeed it does for many of the golfers. The truth is that every member of the golf foursome has some kind of a handicap, if not the one on his score. The same is true of the relationship of people to life; but the crippled person often has to face an unreasonable prejudice, solely because his handicap is visible, whereas the next person who applies for the job may have a much more serious handicap, which is not visible and therefore goes, for the time being, unnoticed.

It is the purpose of the Georgia Warm Springs Foundation to cooperate with those existing agencies—medical and lay—which as a part of their programs contribute directly to the fight against infantile paralysis. It is the purpose of the foundation to approach this in a broad educational manner, without any attempt at centralized control or bureaucratic methods. The name "Georgia Warm Springs Foundation, Inc.," has its origin in the fact that the beginning of the work of this organization was the creation of an institution or hospital at Warm Springs, Ga., devoting its energies to the after-treatment phase of infantile paralysis for a limited number of patients. Out of this small beginning and through public interest and support, as well as through private donations, it has been possible to create a broad program intended to be helpful to the whole cause. Perhaps today the work of the foundation would be better defined under the title "Infantile Paralysis Foundation." It is possible that some day the name of the organization will be changed; in the meantime it is simply a heritage from the manner in which the present program obtained its origin.

A brief outline of the two birthday balls for the President may be in order. The National Committee for the Birthday Ball for the President, under the chairmanship of Mr. Henry L. Doherty, organized parties in a great number of communities in all parts of the United States on the President's birthday, Jan. 30, 1934, with the purpose of presenting the resulting funds to the Georgia Warm Springs Foundation for the furtherance of its program of fighting infantile paralysis. The committee, under the same chairman, conducted a second ball, Jan. 30, 1935, with a program calling for 30 per cent of the funds to be allocated to preventive research and 70 per cent to remain in the local communities for the furtherance of their own programs of after-treatment of infantile paralysis.

On May 9, 1934, there was received from the National Committee for the Birthday Ball for the President the sum of $1,003,030.08.

It is to be noted that, out of this fund, half of the beds at Warm Springs (which total 100) are being supported in full or in part in order that a substantial proportion of the registration may be made up of charity and semicharity patients.

It is not part of the present purpose of the trustees to enlarge the capacity of the institution at Warm Springs; it is felt that the funds which have been entrusted to us through the generosity of the public and private donors can better be utilized in emphasis on a coordinative educational program. The objective is to have the 100 patients at Warm Springs represent a geographic distribution of the whole country and be a cross-section of the problem presented by poliomyelitis as to age, sex, economic condition and degree of physical impairment. The Orthopedic Advisory Committee is assisting in the selection and admission of these 100 patients for treatment and furtherance of the educational and coordinative work of the institution at Warm Springs.

The 1935 birthday ball enabled the national committee to turn over, through the President, the sum of $242,286.82 for medical research work in prevention and immunization. The disbursement of this sum is the responsibility of a special body created for that purpose; namely, the President's Birthday Ball Commission for Infantile Paralysis Research. This lay commission is assisted in its decisions as to the research projects to be supported by a medical advisory board of three doctors, none of whom are themselves engaged in research work in anterior poliomyelitis.

There are a total of six subdivisions of the foundation's work, which are creations or outgrowths of the work of the Georgia Warm Springs Foundation. They are the President's Birthday Ball Commission for Infantile Paralysis Research, the National Committee for the Birthday Ball for the President, the Employment and Rehabilitation Advisory Committee, the Committee for Public Information, the Orthopedic Advisory Committee and the foundation's institution at Warm Springs, Ga. Two of these, the Employment and Rehabilitation Advisory Committee and the Committee for Public Information, are new and in the process of formation. Four medical groups, between which and these subdivisions there exists a coordinative relationship, are playing a most important part in fighting infantile paralysis. These are (1) the American Medical Association, (2) the American Orthopedic Association and the American Academy of Orthopedic Surgeons, (3) the American Pediatric Society and the American Academy of Pediatrics, and (4) the United States Public Health Service and the National Institute of Health.

ARTHUR CARPENTER, New York.

Executive Director, The Committee Against Infantile Paralysis, sponsored by the Georgia Warm Springs Foundation, Inc.

Queries and Minor Notes

ANONYMOUS COMMUNICATIONS and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted on request.

MORTALITY RATE IN TUBERCULOSIS

To the Editor:—What is the present mortality rate of tuberculosis in the United States compared with twenty years ago? How does it rank as to the cause of death compared with heart disease and cancer? Please omit name.

M.D., Ohio.

ANSWER.—The latest available "Mortality Statistics" of the United States Bureau of the Census are those for the year 1932, which give the mortality rate per hundred thousand of estimated population in the registration area of continental United States for tuberculosis of the respiratory system as 56.4, and for other forms of tuberculosis as 6.4. For the year 1910 the mortality rate of tuberculosis of the respiratory system is given as 136, and for other forms of tuberculosis as 24.3. The mortality rate per hundred thousand of estimated population in the registration area in continental United States for the year 1932 for diseases of the heart is given in this volume as 209.2, and for cancer and other malignant tumors as 102.2.

USE OF PERIODIC TUBERCULIN TESTS

To the Editor:—The pediatrician who cares for my children always gives them a tuberculin test twice yearly. They object strenuously to this and I wonder whether it is necessary. Please omit name.

M.D., Oregon.

ANSWER.—The pediatrician who administers the tuberculin test twice yearly for the children under his care has the modern point of view of tuberculosis control. He has two objects in mind: the first is to learn whether the child has become associated with any open case of tuberculosis during the previous six months. He is aware of the fact that there are still many persons who have tuberculosis in a communicable form who are unsuspected of having the disease and that any child may come in contract with such a case and take tubercle bacilli into the body. He also knows that the positive tuberculin test is the first evidence of a tuberculous lesion which any phase of the examination will reveal and that in most cases this is the only evidence available over a considerable period of time and that it may remain the only evidence of the presence of tuberculosis in the body during the lifetime of the individual. Since it is true that a single contact with an open case of tuberculosis may result in a positive tuberculin reaction, one must keep in mind that the association with the open case may have continued. The first and the most important step in the treatment of tuberculosis of the child, even though it is manifested only by the positive tuberculin reaction, is to stop further exposure; that is, to prevent at the earliest possible moment any more tubercle bacilli from entering the body. Convincing evidence has accrued to support the view that the longer exposure to tubercle bacilli is allowed to continue, the greater the chances of the child's falling ill from a clinical form of tuberculosis at some later time in life. The pediatrician is desirous of protecting the children under his care from such occurrence, and therefore he administers the tuberculin test periodically to make sure that such exposure is not occurring.

The second object which the pediatrician has in mind is to detect tuberculosis as soon as possible after it develops. There is a small percentage of infants and children who develop miliary tuberculosis, tuberculous pneumonia or meningitis soon after the first infection is established. Wallgren (*J. Pediat.* **5**:291 [Sept.] 1934) has shown that these very destructive forms of tuberculosis occur most frequently within three months from the time the first infection type of disease results in sensitization of the tissues. While they are reinfection forms of tuberculosis of endogenous origin, there is no way to prevent them after the first infection type of disease is established, and they usually do not respond well to treatment. Even though they occur in only a small percentage of all infected infants and children, the pediatrician must constantly keep these conditions in mind in all children who have recently become infected and who react positively to the tuberculin test. The knowledge that the tuberculin test has been positive may aid him greatly in establishing an early diagnosis if such a child falls acutely ill, since as miliary disease, tuberculous pneumonia and meningitis progress the tissues may become so desensitized that they no longer react positively to the tuberculin test.

Moreover, the pediatrician is aware of the remote dangers from the tuberculous infection that results in the positive tuberculin test. He knows that the sensitization of the tissues to tuberculoprotein is a liability; he also knows that, while the first infection foci of tuberculosis usually do not cause any significant illness, they usually harbor living and virulent tubercle bacilli over long periods of time and that if such bacilli are set free into the adjacent tissues or into the blood stream they are likely to produce reinfection clinical forms of tuberculosis in the bones and joints, kidneys, lungs and other parts of the body. Moreover, he knows that exposure to exogenous sources is dangerous, and therefore he is in a position to instruct the parents to keep such children, so far as it is possible, from contact with open cases of tuberculosis.

The pediatrician who administers the tuberculin test periodically among the children of his clientele and constantly instructs the parents concerning the prevention of the first infection type of tuberculosis and recommends the proper procedures for those who have already become contaminated with tubercle bacilli is practicing the best method of tuberculosis control. In fact, Sir Robert Philip (*Brit. M. J.* **1**:43 [Jan. 10] 1931) of Edinburgh has used this procedure for more than three decades with excellent results. Tuberculin administered in the proper dosage every six months to children reacting negatively to the test results in no harm, nor does it sensitize the tissues. Therefore it is an excellent procedure and the physician who administers it is practicing the most modern phase of diagnosis in tuberculosis. Since the children in this particular case object strenuously to the test, it might be well to substitute the percutaneous method of administration as described by Beatrice R. Lovett (The Percutaneous Tuberculin Reaction, *Am. J. Dis. Child.* **37**:918 [May] 1929) or the tape test described by Ernst Wolff (*Am. Rev. Tuberc.* **27**:308 [March] 1933). These tests do not require the use of a needle or any instrument and are about as accurate as the epidermal test of Pirquet or the intradermal test of Mantoux. In any event, the pediatrician should be permitted to continue the periodic testing of the children.

INTERPRETATION OF TUBERCULIN TEST

To the Editor:—The other day I attempted a tuberculin test on a patient whom I suspected of having tuberculosis. As there was some of the solution left and being curious, I tried the test on myself. I used the tablets Tuberculin P. P. D., put out by Sharpe & Dohme. Much to my surprise the next day I showed a four plus skin reaction, together with a marked systemic reaction. I am 40 years of age and have always been perfectly healthy and have never suspected that I might have tuberculosis. I should like to know your opinion of this positive reaction of the tuberculin test on myself. I should also like to know your opinion as to its value in making a diagnosis in suspected cases of tuberculosis. Please omit name.

M.D., Nebraska.

ANSWER.—From the description of the reaction, one wonders whether it was due to tuberculin or pyogenic micro-organisms that entered the skin through the needle puncture. The tuberculin reaction is not interpreted as four plus unless there is evidence of necrosis, which is usually followed by sloughing of the tissues. Such evidence usually is not available in such a short period of time. If the directions for administering Purified Protein Derivative were carefully followed, when the first dose was administered, there should have been no systemic reaction and no necrosis and sloughing at the site of injection. If the first dose has caused no reaction, the second dose almost never results in necrosis and sloughing or a systemic reaction. Therefore, if the reaction described was due to tuberculin, it would seem that a larger amount was administered than is usually prescribed.

A positive tuberculin reaction at any age provides one with two facts: first, that the reactor has been exposed either directly or indirectly to a person or an animal suffering from tuberculosis or acting as a carrier or disseminator of tubercle bacilli; second, that tubercle bacilli have gained entrance to the body and have set up at least one primary focus. Among persons who have reached the age of 40 years, one must expect to find a rather high percentage reacting positively to the tuberculin test. When such persons were infants and children, little was done in any community to protect them against tubercle bacilli of both the bovine and the human type. Tuberculin testing of cattle had not reached significant proportions, nor was pasteurization of dairy products extensively practiced. Tuberculous patients for the most part remained in their homes and communities with little or no attempt at isolation and almost no successful treatment; thus, they transmitted tubercle bacilli to infants and children. Therefore, the wonder is that any infant or child escaped contamination.

The tubercle bacilli that resulted in the first infection of tuberculosis may have entered the body and set up this disease forty years ago. Again, they may have entered as recently as

as from three to seven weeks before the test was administered or at any intervening time. Regardless of the age in life that tubercle bacilli enter the body, the defense mechanism, consisting of neutrophils, monocytes, lymphocytes, connective tissue cells and so on, quickly focalize and surround them. A fibrous capsule usually is thrown up around these foci of bacilli, and lime may be deposited in the small caseous center of the tubercle. This may later extend into the capsule, and thus a true limestone wall surrounds the bacilli. In fact, in about 25 per cent of the cases a wall of true bone develops around the foci of tubercle bacilli. All this transpires in the bodies of human beings who become infected without causing significant illness, and therefore the individual whose body possesses such lesions usually is not aware of their presence until some special examination is made that detects them. Within about three to seven weeks after tubercle formation begins, the tissues of the body have become sensitive to tuberculoprotein, and this sensitization probably persists as long as the tubercle bacilli remain alive in the body.

Thus the positive reaction indicates the presence of foci of the first infection type of tuberculosis somewhere in the body. Unfortunately, it does not determine whether the reinfection destructive type of disease has developed; but since this type usually occurs only in the bodies of persons who react positively to the tuberculin test, every person with such a reaction should have adequate examination to determine whether the disease exists in a destructive form.

One usually looks first to the chest for the tuberculous lesions, whether they are of the first infection or the reinfection type. The x-ray film is far superior to any other phase of examination in detecting the location of such foci, but in the first infection type tuberculosis the lesions are often so small that they do not cast shadows that can be visualized on the film. Therefore, when the film shows no evidence of the location of the lesion it does not in any way invalidate the tuberculin test, since this test detects microscopic lesions as well as gross ones, whereas the x-ray film detects the location of only macroscopic lesions. However, when the chronic reinfection type of tuberculosis develops in the lungs to such an extent that it jeopardizes the health of the individual, it is usually sufficiently large to cast a shadow that can be seen on the x-ray film. Such shadows can usually be detected two or three years before the lesions cause any significant symptoms or abnormal physical signs.

The fact that a person who reacts positively to the tuberculin test appears well and has experienced no symptoms is insignificant. Such an individual may have definitely progressive reinfection type tuberculosis. Indeed, all persons who suffer from moderately or far advanced pulmonary tuberculosis passed through such a stage when their health was good and their disease could have been detected by tuberculin and roentgen examination.

The great success of the veterinarian in controlling tuberculosis among the cattle of this country is due to the fact that he recognized the specificity of the tuberculin test and that he sought tuberculosis among animals that appeared healthy. It is not until tuberculosis is sought among human beings who appear healthy and treated before it causes illness that significant further strides will be made in the control of tuberculosis in human beings.

The fact that the age of 40 years has been attained does not offer any assurance that clinical tuberculosis may not develop in the body. Although there is a popular belief that after middle life tuberculosis is a rare disease, the truth is that for the number of persons living beyond the age of 50 years the incidence of tuberculosis in a communicable form is higher than during any other age period in life.

In suspected cases of tuberculosis the tuberculin test is of great value. The degree of reaction probably is of no significance, but the test informs one with a high degree of certainty as to the presence or absence of foci of tuberculosis in the body. Whether these foci have anything to do with the symptoms or conditions causing one to suspect clinical tuberculosis must be determined by further examination, including x-ray films of the chest.

SCHOOL CHILDREN AND TUBERCULOSIS

To the Editor:—When should children diagnosed as having pulmonary tuberculosis be excluded from school? Please omit name and address.

M.D., Ohio.

ANSWER.—In several states, laws exist that provide for the exclusion from school of children with tuberculosis. Formerly, tuberculosis was known to exist only when symptoms were present and abnormal physical signs could be elicited; for example, tuberculosis of the spine was not detected until knuckling or some other abnormal physical sign was evident and considerable pain was present. Likewise, pulmonary tuberculosis was not detected until symptoms, such as hemorrhage, cough, expectoration and weight loss, were present and abnormal physical signs, such as râles, could be heard over the area of disease. Such patients with pulmonary tuberculosis were nearly always spreaders of tubercle bacilli, and the individual was in need of drastic treatment when the disease was detected.

Modern methods of diagnosis now make it possible to detect pulmonary tuberculosis long before any symptom or any abnormal physical sign is present and long before the disease is communicable. Obviously, laws designed to exclude communicable cases of tuberculosis from the schools should not be applied in such cases.

While a good many school children, particularly in large cities, have the first infection type of tuberculosis, as indicated by a positive tuberculin test, and occasionally have deposits of calcium, which cast shadows on the x-ray film, it is particularly fortunate that school children who have not reached the high school age rarely have the reinfection form of tuberculosis. The first infection type of tuberculosis usually is not communicable in school children younger than the high school age. While it is true that, when the first infection type of disease is seen in the pneumonic stage, one may recover tubercle bacilli from the gastric contents in a fair percentage of the cases (Poulsen, Valdemar; Jensen, K. A., and Husted, E: The Demonstration of Tubercle Bacilli in Small Children with Pulmonary Tuberculosis, *Am. J. Dis. Child.* **37**:900 [April] 1929. Willis, H. S.: *Tr. Nat. Tuberc. A.*, 1933, p. 135. Nalbant, J. P.: *Am. Rev. Tuberc.* **29**:481 [April] 1934. Gourley, Ina, *ibid.* **29**:461 [April] 1934). It is also true that such children rarely cough or raise sputum. Therefore bacilli are usually eliminated from their bodies through the intestinal tract, and where the sanitary conditions are good there is little or no danger of disseminating bacilli to others. Moreover, the first infection type of tuberculosis is seen in the pneumonic stage much more frequently in infants than in school children. Searches made for tubercle bacilli even in the gastric contents from children with calcifications in their lesions are rarely successful; therefore between the ages of 5 and 12 years the human body is unusually free from pulmonary tuberculosis of a destructive form and rarely do children of this age disseminate tubercle bacilli to others. Children with the first infection type of tuberculosis in this age period require no treatment other than to protect them against open cases of tuberculosis in their homes and elsewhere. Therefore there is no need to enforce the law that provides for the exclusion of tuberculous children with the first infection type.

If the term "tuberculous" were carried to the logical conclusion and the law were rigidly enforced, every child reacting positively to the tuberculin test would be excluded from the schools. While in some rural sections of the nation not more than 5 or 6 per cent of the school children react positively to the tuberculin test, at the same time in our cities, for example Chicago, approximately 30 per cent of the high school children have the first infection type of tuberculosis. Overenthusiasm in the exclusion of children from school because they react positively to the tuberculin test and have evidence of calcium deposits in the lungs or hili is capable of great injustice to the children and serious harm to the cause of tuberculosis control in general.

In one small city where the tuberculin test was administered and the positive reactors had x-ray films made of the chest, approximately seventy children were excluded from school, of whom not more than one had the reinfection type of disease requiring treatment and was a menace to the other children. The remainder of the children excluded had the noncommunicable first infection type of disease with no treatment indicated. With such action taken against these children, it will become increasingly difficult to secure consent of parents to examine children at any age. Although the reinfection type of disease in a communicable form is extremely rare between the ages of 5 and 12 years, it does occasionally occur, and therefore examination of all school children with tuberculin, x-ray films and so on should be carried out, in order to detect this occasional case, as well as the first infection type.

As adolescence approaches, and thereafter, some of the children who have previously been known to have the first infection type of tuberculosis begin to show evidence of the reinfection type of disease. While this may develop in any part of the lung, it most often makes its appearance just beneath the shadow of the clavicle in one or both lungs. Usually such lesions do not cause cough, expectoration or any other symptom for a year or more after they can be detected by the x-ray film, so that their disease is not communicable. However, if by serial x-ray films or by other laboratory procedures, such

as the differential leukocyte count and the red cell sedimentation test, the disease is found to be progressive, treatment should be instituted at once.

Exclusion from school should depend on the communicability of the disease and the necessity of treatment for the individual. This measure is rarely indicated before the high school age is reached, but during this period the reinfection type of disease is more frequently seen. Therefore great care should be exercised to find children who have this type of disease in a progressive form, to isolate them before they spread bacilli to others, and to treat them while treatment is of some avail.

HAY FEVER POLLENS IN PENNSYLVANIA

To the Editor:—In reading literature of various concerns manufacturing pollen extracts for use in hay fever, I am not able to find two lists that agree as to which are the possible causes of August to frost hay fever in Pennsylvania. A composite of all the lists is as follows: short ragweed, long ragweed, redroot (pigweed), Russian thistle, corn, goosefoot (lamb's quarters), cocklebur, mugwort, sunflower, goldenrod, burweed, marsh elder, sheep sorrel, careless weed, dock, hemp, plantains, spiny amaranth and wormwood. Is it necessary to test a patient for all these pollens in a persistent case of hay fever? Please omit name.

M.D., Pennsylvania.

ANSWER.—It is true that the literature regarding the various pollens that may cause August to frost hay fever in Pennsylvania seems somewhat confusing. However, careful reading of the literature of the various firms that manufacture pollen extracts for use in treating hay fever will bring out the unanimous fact that the main cause of August to frost hay fever in Pennsylvania is the ragweed family, consisting chiefly of short or dwarf ragweed (Ambrosia artemisiaefolia) and the giant or high ragweed (Ambrosia trifida). These two constitute the main cause of fall hay fever not only in Pennsylvania but throughout most of the section of the country east of the Rockies and including a large part of Canada. These ragweeds do not grow in Europe.

All the other weeds mentioned in the query are of distinctly minor importance or of no importance at all. However, in cases in which relief does not follow the proper injections of ragweed pollen extract or the symptoms do not coincide definitely with the time of pollination of the ragweeds, it is well to search for some local weed other than the ragweeds as a possible or even probable cause of these unusual cases.

Next to the two ragweeds in Pennsylvania come cocklebur (Xanthium commune) and burweed marsh elder (Iva xanthiifolia). These two give off some pollen but not nearly as much as do the ragweeds. Marsh elder (Iva ciliata) blooms from July to September and is not important.

Pigweed belongs to the Amaranth family, which is very important in the Southern and Western states but of minor importance in Pennsylvania. The members of this group are rough pigweed (Amaranthus retroflexus), spiny amaranth (Amaranthus spinosus), tumbleweed (Amaranthus graecizans) and careless weed (Amaranthus Palmeri). These pollinate chiefly from July to September.

The wormwoods pollinate from the end of July to October and constitute the main cause of hay fever west of the Rockies, where they are as important in causing hay fever as are the ragweeds east of the Rockies. They are of practically no importance in Pennsylvania, although they are found scattered in most parts of the United States.

The goosefoot family (Chenopodiaceae) is a very important cause of hay fever in the Middle West, especially in the Dakotas and Colorado. This family includes Chenopodium, Kochia, Atriplex and Salsola, whose most important member is Russian thistle (Salsola pestifer). Of these the lamb's quarter (Chenopodium album) may be of some importance in Pennsylvania.

The Plantain family is a minor cause of hay fever all over the United States and most of Canada. Its chief member is English plantain (Plantago lanceolata).

The Rumex genus of the buckwheat family is also of some importance in hay fever work. Sheep's sorrel (Rumex acetosella) and yellow or curly dock (Rumex crispus) throw out a moderate amount of pollen. They are probably insect pollinated to some extent.

The hemp family is also of minor importance. It consists of hemp (Cannabis sativa) and hop (Humulus lupulus). These pollinate from July to August. Sunflower and goldenrod are insect pollinated, at least for the most part, and are unimportant. The pollen of corn is heavy and carried by the wind for only short distances for that reason. It therefore is important only to those who are in close contact with such pollen.

It will be seen from the foregoing that one will get the best results in the average case by injecting an extract of equal parts of giant and short ragweed. When this extract fails, search for some other pollen should be instituted.

THE VON RUCK VACCINE

To the Editor:—A young woman patient of mine with tuberculosis has been recommended to the von Ruck Memorial Sanatorium at Asheville, N. C. What is their treatment? Is it approved by the A. M. A.?

M.D., Kansas.

To the Editor:—I have had an inquiry concerning the use of von Ruck's serum in the treatment of tuberculosis. I have been unable to find any reference either in my quackery files or in the literature on this subject. Please give me any information that you have on the subject.

M.D., Texas.

ANSWER.—From these and other inquiries that have come to THE JOURNAL, it would appear that the von Ruck vaccine is in for another period of exploitation. The treatment was first given publicity in 1912 by Dr. Karl von Ruck of Asheville, N. C., who was born in 1849 and was graduated in medicine in 1879. Dr. von Ruck died in 1922. In the period 1912-1915 Dr. von Ruck received wide publicity for his alleged discovery of a "tuberculin," which, he asserted, would produce immunity from tuberculosis in both man and animals. A preliminary announcement by Dr. von Ruck entitled "A Practical Method of Prophylactic Immunization Against Tuberculosis" was published in THE JOURNAL, May 18, 1912. Through political influence the United States Public Health Service was called on to investigate the von Ruck vaccine, and the newspapers published columns of laudatory matter on the subject. The results of the investigation were published in THE JOURNAL, June 21, 1913, in an article entitled "Animal Experiments With von Ruck's New Tuberculoproteins," by R. S. Cummings, M.D. The sum and substance of the investigations made under government supervision were that immunity was not produced by the vaccine, but rather that the vaccine increased the susceptibility to tuberculosis. The newspapers gave practically no publicity to these unfavorable findings. The government studies were begun in Asheville at Dr. von Ruck's laboratory but were later transferred to the Hygienic Laboratory in Washington because Dr. von Ruck would not concede the right of the government's physicians to conduct an independent and controlled investigation and summarily interrupted their investigation in Asheville. It seemed apparent that Dr. von Ruck did not have sufficient confidence in his method to be willing to be investigated unless he supervised and controlled the investigation. These facts were discussed editorially in THE JOURNAL, Jan. 23, 1915. Further political attempts were made to boost the vaccine by printing at government expense as a Senate document a mildly favorable article by two physicians. Time has obviously sustained the findings of the Public Health Service physicians, for, if the von Ruck vaccine possessed the virtues that were claimed for it, the scientific world would long since have adopted it.

SEDIMENTATION TEST IN TUBERCULOSIS

To the Editor:—A colored woman, aged 19, entered a hospital September 12 with unilateral tuberculosis, apical, with caseation and cavitation. As part of the routine examination, a determination of the sedimentation time was attempted. Immediately after having been mixed with fresh 2.5 per cent sodium citrate solution, the blood clotted. The attempt was repeated with the same results. Three control tubes were run on other patients with the same solution, and these did not clot. The bleeding time of the patient is two minutes and the clotting time seven and one-half minutes. Her blood pressure is 105 systolic and 75 diastolic. Please inform me how this difficulty can be overcome and what effect it will have, if any, on the prognosis. The patient's hemoglobin is 60 per cent and red blood cell count 4,900,000. There is marked and rapid retraction of the clot. Aside from this and the tuberculosis, the patient seems to be normal. Please omit name.

M.D., Tennessee.

ANSWER.—The conditions reported seem to indicate an unusually high fibrin content in the blood plasma. Perhaps there is also a high globulin content and a proportionate decrease in albumin. Such a shift in the protein quotient with a high fibrin content is usually indicative of a poor prognosis. The fibrin content at any one time represents approximately the tissue destruction going on at that moment. In this case it is the acute caseation and is both acute and extensive. A subacute or a fibroid lesion, although extensive in size, will not show a proportionate rise in fibrin.

The only way to perform this sedimentation is to try a more concentrated solution of citrate or use a smaller quantity of blood for the amount of citrate until a point is reached at which clotting will not result. A correction will have to be

made for the dilution by comparing it to the speed of cells falling in pure citrate. There is no other way to handle it. No doubt the results will be high, irrespective of the method used.

BRONCHITIS WITH BRONCHIECTASIS

To the Editor:—I am reporting a case of probably a fetid chronic bronchitis with perhaps a mild degree of bronchiectasis. A man, aged 57, had measles at the age of 18 and as a result of early exposure developed a heavy cold, followed by prolonged coughing and with every symptom of an active tuberculosis for a few years following. Since that time the patient has enjoyed the average health and has lost no weight or time from work but has had a chronic cough with more or less of a gray-brownish expectoration, which varies according to the season of the year. The tonsils were removed years ago, but more or less chronic throat and laryngeal trouble persists in association with the bronchitis. The teeth have been kept in good condition. The general condition is otherwise negative except for a chronic myocarditis, which has developed in the last ten years and in my opinion is a result of the chronic infection of the chest. Beginning about five years ago a very fetid disagreeable odor of the breath developed and no remedy that I have tried has been of any avail. It is a very disagreeable condition with which I have to contend and evidently is quite repulsive to those about me (the patient being myself). I feel reasonably certain of the correctness of the diagnosis and my principal reason for writing you is to ask for any information concerning the treatment or at least some method by which I may be able to control or mask this condition. I have exhausted all information that I have with no avail. Since my breath is sufficient advertising, I will ask that you withhold my name. M.D., Nebraska.

ANSWER.—The information available does not permit of a complete diagnosis, without which suggestions as to treatment are apt to be of little value. Chronic bronchitis with a mild degree of bronchiectasis seems likely from the history. Clinically, this condition is often associated with a secondary to chronic sinusitis. It is assumed that pyorrhea is absent. Additional information required includes a special nose and throat examination to rule out ozena, and sinus roentgenograms to rule out chronic sinus infection. If these conditions are present, appropriate treatment should be of benefit. Special examinations directed to the lungs are important, particularly if ozena and chronic sinusitis are absent; these should include chest roentgenograms and aerobic and anaerobic cultures of fresh sputum apparently coughed up from the lungs.

DIET SENSITIVITIES

To the Editor:—I have had two patients tell me that a doctor in this district has forbidden them drinking highballs made with ginger ale, advising them to substitute a "club soda." Both patients are in excellent health. Is there any scientific medical opinion published on this subject? ELLA A. COUGHLAN, M.D., Orange, N. J.

ANSWER.—The physician who gave this advice is probably sensitive to ginger ale or else knows of some one who is. More and more physicians are now learning to fit the diet to the patient and not to hand it out ex cathedra. There is nothing truer than that one man's food is another man's poison, but a corollary of this is that because of food or a drink is poison to some unfortunate individual it is not necessary to tell ninety-nine other persons that they must not partake of it. The physician may ask a patient to watch and see whether some substances are toxic for him, but if they do not prove to be toxic why should the man go on depriving himself? If any diet fails to bring results in a few days or weeks, it should be discontinued.

TUBERCULIN TESTS

To the Editor:—With reference to a tuberculin test in which the purified protein derivative was used intradermally, what is the significance of elevation and central necrosis at the site of injection, occurring after the prescribed limit of forty-eight hours? This condition appeared on the seventh or eighth day. The dose was 0.00002 mg.

ROBERT E. LEE, M.D., Chicago.

ANSWER.—The correspondent does not state whether there occurred the usual reaction to tuberculin at the end of forty-eight hours, followed by the elevation and central necrosis at the site of injection on the seventh or eight day. If the usual reaction occurred first, the later development probably represents a four plus reaction. In persons whose tissues are extremely sensitive to tuberculoprotein, necrosis may result and evidence of it persist for many days or weeks. The necrotic tissue may slough out, the reaction being comparable to the formation of a cavity in the lungs when a new focus of tuberculosis develops in the sensitized tissue.

However, if there was no reaction at the end of forty-eight hours and the elevation and central necrosis were the first evidence on the seventh or eighth day, there are two possibilities: One is the delayed reaction, which Pirquet described as a "torpid" reaction (Frequency of Tuberculosis in Childhood, THE JOURNAL, Feb. 27, 1909, p. 675). While Pirquet's torpid reactions resulted from the epidermal test, they have been observed also when the intradermal test has been employed. However, the particular type of reaction described by the correspondent has not been reported by any one who has used purified protein derivative. The other possibility is that infection with pyogenic micro-organisms may have occurred through the needle tract.

LATENT SYPHILIS

To the Editor:—A white man, aged 29, contracted syphilis nine years ago. One month after the appearance of the chancre, treatment was begun, consisting of daily mercury inunctions for eighteen months and neoarsphenamine once weekly for eight weeks at a time over a period of two years, with alternating rest periods varying between two weeks and a month. I am unable to ascertain the dosage of neoarsphenamine. The patient became Wassermann negative after several months, and about eight subsequent tests taken for the following two years remained negative. The first Wassermann reaction since then, taken recently, was 3 plus. What therapy would you advise? Please omit name.

M.D., New York.

ANSWER.—If a repetition of the Wassermann test still proves positive, the case should be treated as one of latent syphilis. Iodides and bismuth or mercury compounds should be administered first, followed by one of the arsphenamines. Treatment will depend on the results of subsequent serologic tests and a spinal fluid examination.

FRACTURE OF THE TIBIA

To the Editor:—Kindly tell me the best way to treat a fracture of the tibia which extends into the knee joint. There is no displacement. When should passive movements be started? When active movements? When weight bearing? M.D., Minnesota.

ANSWER.—If there is no displacement, fracture of the tibia extending into the knee joint should be treated by balanced traction and overhead suspension, with early active motion. There should be no hurry for passive motion. Adequate immobilization should be continued until union has occurred and it is probable that movement will take care of itself. Protective weight bearing with the use of a caliper brace and crutches may be started usually at the end of from eight to ten weeks. Böhler's clamp and the Forrester clamp and open operation are evidently not required in the case described.

ARTIFICIAL PNEUMOTHORAX IN TUBERCULOSIS

To the Editor:—In an answer to a query on the treatment of tuberculosis (THE JOURNAL, September 7, p. 818) the following statement is made: "In every case of minimal progressive pulmonary tuberculosis which is unilateral, artificial pneumothorax should be instituted, since it is the only method of bringing about adequate rest of the diseased part. Lying in bed gives the lung but little rest." Lying in bed for a long enough time, however, will give the lung enough rest and increase the bodily resistance sufficiently to heal the disease in most incipient cases. This is no argument against the proper use of artificial pneumothorax, which I have found most valuable in many cases, but I do not believe that any one is justified in making the dogmatic statement that pneumothorax should be used in every case of minimal, progressive, unilateral pulmonary tuberculosis.

Although artificial pneumothorax is a comparatively safe procedure, many complications occur even in the best equipped tuberculosis hospitals, and if this treatment should be attempted everywhere, often without x-ray control, it is very likely that more harm than good would be done.

The patient under discussion was given only three months of rest treatment, an entirely inadequate length of time for the healing of any active progressive tuberculous lesion, though it is granted that if the patient must get up in three months the danger of relapse is less with a good pneumothorax than without it. It is probable that roentgen examination would have shown that the disease was in a more advanced stage than was suspected from the physical signs and that pneumothorax was indicated. Nevertheless, the fact remains that some of the best cures of tuberculosis are made with the old fashioned rest treatment, continued for a sufficient length of time. To determine what constitutes a sufficient length of time in the individual case is one of the most difficult tasks of the physician, and the roentgen observations, physical examination, symptoms and laboratory tests are all to be taken into consideration. After the activity of the disease has apparently subsided, a few extra months of at least partial rest should be allowed for good measure.

It is true that general rest without pneumothorax or other effective collapse therapy is futile in many cases, but the point to be emphasized is that it takes years to heal any definite tuberculous disease completely either with or without pneumothorax, and the man who counts on pneumothorax to heal his tuberculous patients in a hurry is going to be disappointed. In the last analysis the recovery of a patient from tuberculosis, as from any other infectious disease, depends on his forces of resistance. Rest, together with proper food, good climate and so on, is the best method available of increasing the patient's resistance to his disease, and no doubt the good results obtained from rest treatment are due more to the raising of resistance than to the lessened movement of the lungs.

LEROY ELRICK, M.D., Denver.

Medical Examinations and Licensure

COMING EXAMINATIONS

AMERICAN BOARD OF DERMATOLOGY AND SYPHILOLOGY: *Written examination for Group B applicants* will be held in various cities throughout the country, March 14. *Oral examination for Group A and B applicants* will be held in Kansas City, Mo., May 11-12. *Applications for written examination should be filed with the secretary before Jan. 15.* Sec., Dr. C. Guy Lane, 416 Marlboro St., Boston.

AMERICAN BOARD OF OPHTHALMOLOGY: Kansas City, Mo., May 11. Asst. Sec., Dr. Thomas D. Allen, 122 S. Michigan Ave., Chicago.

AMERICAN BOARD OF ORTHOPAEDIC SURGERY: St. Louis, Jan. 11. Sec., Dr. Fremont A. Chandler, 180 N. Michigan Ave., Chicago.

AMERICAN BOARD OF OTOLARYNGOLOGY: Kansas City, Mo., May 9. Sec., Dr. W. P. Wherry, 1500 Medical Arts Bldg., Omaha.

AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY: New York, Dec. 30. Sec., Dr. Walter Freeman, 1726 Eye St., N. W., Washington, D. C.

ARIZONA: *Basic Science.* Tucson, Dec. 17. Sec., Dr. Robert L. Nugent, Science Hall, University of Arizona, Tucson.

COLORADO: Denver, Jan. 7. Sec., Dr. Harvey W. Snyder, 422 State Office Bldg., Denver.

DISTRICT OF COLUMBIA: Washington, Jan. 13-14. Sec., Commission on Licensure, Dr. George C. Ruhland, 203 District Bldg., Washington.

HAWAII: Honolulu, Jan. 13-16. Sec., Dr. James A. Morgan, 48 Young Bldg., Honolulu.

ILLINOIS: Chicago, Jan. 28-30. Superintendent of Registration, Department of Registration and Education, Mr. Homer J. Byrd, Springfield.

KANSAS: Topeka, Dec. 10-11. Sec., Board of Medical Registration and Examination, Dr. C. H. Ewing, 609 Broadway, Larned.

MARYLAND: *Medical (Regular).* Baltimore, Dec. 10-13. Sec., Dr. John T. O'Mara, 1211 Cathedral St., Baltimore. *Medical (Homeopathic).* Baltimore, Dec. 10-11. Sec., Dr. John A. Evans, 612 W. 40th St., Baltimore.

MINNESOTA: *Basic Science.* Minneapolis, Jan. 7-8. Sec., Dr. J. C. McKinley, 126 Millard Hall, University of Minnesota, Minneapolis. *Medical.* Minneapolis, Jan. 21-23. Sec., Dr. Julian F. Du Bois, 350 St. Peter St., St. Paul.

NATIONAL BOARD OF MEDICAL EXAMINERS. *Parts I and II.* Feb. 12-14, May 6-8, June 22-24, and Sept. 14-16. *Part III* tentatively scheduled as follows: Chicago, Jan. 7-9 and New York, Jan. 13-15. Ex. Sec., Mr. Everett S. Elwood, 225 S. 15th St., Philadelphia.

NEBRASKA: *Basic Science.* Omaha, Jan. 7-8. Dir., Bureau of Examining Boards, Mrs. Clark Perkins, State House, Lincoln.

NEW YORK: Albany, Buffalo, New York and Syracuse, Jan. 27-30. Chief, Professional Examinations Bureau, Mr. Herbert J. Hamilton, 315 Education Bldg., Albany.

NORTH CAROLINA: *Endorsement.* Raleigh, Dec. 9. Sec., Dr. Ben J. Lawrence, 503 Professional Bldg., Raleigh.

NORTH DAKOTA: Grand Forks, Jan. 7-10. Sec., Dr. G. M. Williamson, 4½ S. 3d St., Grand Forks.

OKLAHOMA: Oklahoma City, Dec. 11. Sec., Dr. James D. Osborn Jr., Frederick.

RHODE ISLAND: Providence, Jan. 2-3. Dir., Department of Public Health, Dr. Edward A. McLaughlin, 319 State Office Bldg., Providence.

SOUTH DAKOTA: Pierre, Jan. 21-22. Dir., Division of Medical Licensure, Dr. Park B. Jenkins, Pierre.

TENNESSEE: Memphis, Dec. 18-19. Sec., Dr. H. W. Qualls, 130 Madison Ave., Memphis.

UTAH: Salt Lake City, Dec. 10-12. Dir., Department of Registration, Mr. S. W. Golding, 326 State Capitol Bldg., Salt Lake City.

VIRGINIA: Richmond, Dec. 11-13. Sec., Dr. J. W. Preston, 28½ Franklin Rd., Roanoke.

WASHINGTON: *Basic Science.* Seattle, Jan. 9-10. *Medical.* Seattle, Jan. 13-15. Dir., Department of Licenses, Mr. Harry C. Huse, Olympia.

WISCONSIN: *Basic Science.* Milwaukee, Dec. 21. Sec., Prof. Robert N. Bauer, 3414 W. Wisconsin Ave., Milwaukee. *Medical.* Madison, Jan. 7-10. Sec., Dr. Robert E. Flynn, 410 Main St., LaCrosse.

Delaware June Report

Dr. Joseph S. McDaniel, secretary, Medical Council of Delaware, reports the written examination held in Wilmington, June 11-12, 1935. The examination covered 10 subjects and included 100 questions. A grade of 75 per cent in each subject was required to pass. Eighteen candidates were examined, 13 of whom passed and 5 failed. One physician was licensed by reciprocity and 2 physicians were licensed by endorsement. The following schools were represented:

School	PASSED	Year Grad.	Per Cent
George Washington University School of Medicine		(1933)	81.5
Rush Medical College		(1934)	81.9
University of Maryland School of Medicine and College of Physicians and Surgeons		(1934)	81.6
Columbia University College of Physicians and Surgeons		(1933)	81.4
Hahnemann Medical College and Hospital of Philadelphia		(1933) 85.8, (1934) 84.1, 86.2, 87, 87.7	84.8,
Jefferson Medical College of Philadelphia		(1934)	83.7
University of Pennsylvania School of Medicine		(1933)	79.3
Medical College of Virginia		(1934)	78.6

School	FAILED	Year Grad.
University of Georgia School of Medicine		(1932)
University of Maryland School of Medicine and College of Physicians and Surgeons		(1934)
Hahnemann Medical College and Hospital of Philadelphia		(1934, 2)
Temple University School of Medicine		(1934)

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
University of Maryland School of Medicine and College of Physicians and Surgeons		(1920)	Maryland

School	LICENSED BY ENDORSEMENT	Year Grad.	Endorsement of
Yale University School of Medicine		(1930)	N. B. M. Ex.
Woman's Medical College of Pennsylvania		(1932)	N. B. M. Ex.

Michigan June Examination at Detroit

Dr. J. Earl McIntyre, secretary, Michigan State Board of Registration in Medicine, reports the written examination held at Detroit, June 5-7, 1935. The examination covered 14 subjects and included 100 questions. An average of 75 per cent was required to pass. Ninety-six candidates were examined, all of whom passed. The following schools were represented:

School	PASSED	Year Grad.	Per Cent
George Washington University School of Medicine		(1934)	78.2*
Northwestern University Medical School		(1935)	81.3*
Rush Medical College		(1934) 84.3, (1935) 78.9,	82.3*
School of Medicine of the Division of the Biological Sciences		(1934) 85.1,† (1935) 80.7,*	85.2
University of Illinois College of Medicine		(1935)	80.8
Wayne University College of Medicine		(1935)	75.5,†
76.7,† 77.4,† 78.4,† 78.9,† 79.1,† 79.2,† 79.3,† 79.3,† 79.4, 79.8,† 79.9,† 80, 80.1,† 80.2,† 80.3,† 80.8,† 80.9,* 81.1,† 81.2,† 81.2,† 81.3,† 81.5.† 81.5,† 81.6,† 81.7,† 81.7,† 81.8,† 81.8,* 81.9,* 82,† 82,† 82,† 82.2,† 82.3,† 82.5,† 82.6,† 82.6,† 82.6,† 82.7,† 82.7,† 82.7, 82.8,† 82.8,† 83,† 83.1,† 83.2,† 83.2,† 83.2,† 83.2,† 83.3,† 83.4,† 83.4,† 83.4,† 83.4,* 83.5,† 83.5,† 83.6,† 83.7,† 83.8,† 83.9,† 83.9,† 84,† 84,† 84,† 84,† 84.1,† 84.2,† 84.4,† 84.4,† 84.4, 84.6,† 84.6,† 84.7,† 84.8,† 85,† 86.4†			
University of Minnesota Medical School		(1921) (1929) 76.6,* (1935) 85,* 85.1	85.2,
University of Buffalo School of Medicine		(1932)	84.7
University of Pennsylvania School of Medicine		(1933)	83.6, 84.6,* 87.7
University of Texas School of Medicine		(1932)	82.6
Marquette University School of Medicine		(1935) 81.3,*	83.2

* License has not been issued.

† This applicant has completed the medical course and will receive his M.D. degree on completion of internship. License has not been issued.

Book Notices

Policies and Procedures in Public Health: Proceedings of the Annual Conference of the Advisory Council of the Milbank Memorial Fund Held on March 27 and 28, 1935, at the New York Academy of Medicine. Paper. Pp. 115. New York: Milbank Memorial Fund, 1935.

This brief report of the proceedings of the annual conference of the advisory council of the Milbank Memorial Fund consists of summaries setting forth the principal points in discussions of round-table groups dealing with public health problems, with health education, with tuberculosis, with population studies and with venereal disease. In addition, it contains a speech by Albert B. Milbank, one by Surg. Gen. Hugh S. Cumming, one by Dr. Simon Flexner, and one by Hon. Josephine Roche, assistant secretary of the treasury. Dr. Cumming's address on public health and the medical profession will be of particular interest to physicians and so will the remarks of Miss Roche on economic security and health. Dr. Flexner's remarks on scientific discovery and the public health constitute a dissertation on the theme taken from Dr. William H. Welch: "While public health is the foundation of the happiness and prosperity of the people, and its promotion is recognized as an important function of government, how wide is the gap between what is achieved and what might be realized." Miss Roche's remarks are largely in support of the social security program, which at the time this discussion took place was pending but which has since been enacted in the Social Security Act.

In view of the impression which has prevailed among physicians that the Milbank Fund has been committed to socialization of medicine, an impression that gained currency perhaps largely through the activities of Mr. John Kingsbury, certain statements in this report are of particular interest. In the report of the round-table discussion on public health problems under the chairmanship of C. E. A. Winslow, D.P.H., the following statement occurs as a part of the discussion of rural service for the promotion of maternity and infancy health in Cattaraugus County: "The operation of medical services under lay direction is never satisfactory. It was the belief, therefore, of the members of the round table that the provision of medical care for maternity and infancy at public expense should be placed under the direction of a county health department." Physicians will readily agree with the first sentence in the

excerpt just quoted but are much less likely to agree that it leads necessarily to the conclusion which immediately follows. Wise health officers who have learned that the public cannot be educated to distinguish between prevention and treatment will be exceedingly reluctant to have their departments thrust into the practice of medicine.

Perhaps the greatest interest of all attaches to the remarks of Mr. Albert Milbank, who has given evidence, since certain representations were made to him by the medical profession, that closer relationship between himself and the activities of the Milbank Fund may be reflected in a changed attitude on the part of the fund, as shown in the following excerpts from his remarks:

"You are doubtless aware, in a general way, of the experiments that are being conducted in various parts of the country under the auspices of professional groups and of medical societies to bridge the economic gap between those in need of medical care and those equipped to supply that care without, however, resorting to compulsory contributory health insurance. Some of these activities are reaching a stage where their effectiveness may be profitably studied and evaluated.

"It is my hope that, after the new Medical Advisory Committee which your Chairman has been authorized to form has been organized, some way may be found for our Fund to cooperate with one or more of these professionally conducted experiments.

"There are other subjects, not related to medical economics, which can also be explored in collaboration with physicians whose primary interest is in the private practice of medicine but who have as well a very real interest in preventive measures. This common interest will form a natural point of contact between the Fund and the profession in the future as it has in the past and will serve to dissipate the erroneous impression that our Fund is chiefly, if not exclusively, concerned with the subject of the cost of medical care. . . .

"Our Board of Directors has not endorsed compulsory contributory health insurance or any other plan to distribute the costs of medical care.

"We have not sponsored any form of legislation, Federal or State, bearing upon this subject nor have we given, directly or indirectly, any financial support in furtherance of such legislation.

"The studies made by the members of our staff on this or any other subject in the field of public health, as broadly defined, will be made available to the various groups interested in that field but the Fund will not assume the rôle of advocate either in favor of or against specific solutions of the problems which are the subject matter of such studies.

"We will cooperate with the groups operating in the broad field of health—whether they be doctors, dentists, hospital managements, nurses, welfare organizations, or governmental agencies—to the extent that our cooperation is desired and to the extent that a basis of mutual helpfulness can be established within the resources at our disposal."

The large influence which voluntary foundations heavily endowed have acquired in the field of health makes them a real factor which must be reckoned with. The evidence that the point of view of the medical profession is gaining increased consideration at the hands of the Milbank Fund might be observed with profit by the directors and the executives of certain other foundations.

Apparatus and Technique for Roentgenography of the Chest. By Charles Weyl and S. Reid Warren Jr., Moore School of Electrical Engineering, University of Pennsylvania. Cloth. Price, $5. Pp. 166, with 39 illustrations. Springfield, Illinois, & Baltimore: Charles C. Thomas, 1935.

The authors, feeling that the roentgenologist, being busy with the practice of his profession and keeping abreast of medical developments, has little time for a thorough study of physical principles, discuss the physical problems of chest roentgenography. The book is divided into four chapters and an appendix. The first chapter consists of a review of the physical phenomena underlying the production of chest roentgenograms. Available roentgenographic apparatus is discussed in chapter II, with a presentation of the advantages and disadvantages of the various types. The quality and interpretability of the finished film depends on the roentgenographic densities, contrast and sharpness. The effect of varying the controllable roentgenographic factors is discussed in chapter III. The experienced roentgenologist in most instances passes judgment on the quality of roentgenograms. The authors feel that a more accurate method of judgment can be carried out by the use of a densitometer. Chapter IV consists of a discussion of the scientific analysis of roentgenograms by means of various physical tests. For such analysis every roentgenogram should have impressed on it a roentgenographic record of a standard aluminum ladder and timing disk. A comparative densitometer and a standard density table are used in measuring the roentgenographic densities. An appendix on basic and elementary electrical principles has been added to the volume. Much of the material covered is common knowledge to experienced roentgenologists, who will probably find it cumbersome and time consuming to employ the rather complicated method of judging the quality of a roentgenogram recommended by the authors.

Traitement des fractures et luxations des membres. Par Jacques Leveuf, professeur agrégé à la Faculté de médecine de Paris, Charles Girode et Raoul-Charles Monod, chirurgiens des hôpitaux de Paris. Préface du Professeur Pierre Delbet. Second edition. Paper. Price, 50 francs. Pp. 447, with 314 illustrations. Paris: Masson & Cie, 1935.

This treatise on fractures and dislocations is of an eclectic nature, as the authors confine themselves to a description of methods used by them; hence a bibliography and references to other methods have been omitted.

The first part of the book deals with fractures. The first chapter offers a discussion of general principles of treatment, including first aid, temporary immobilization of fractured limbs, final conservative or surgical therapy, and after-care. The advice to use sheets as hammocks in which patients with broken hips are suspended during transportation will probably not meet with approval in this country, where a board is preferred for efficient immobilization. Local anesthesia is advocated for reduction of fractures, but its technic is not described. In children, tribrom-ethanol anesthesia is being used. Spinal anesthesia is recommended for reduction of hip fractures. The technic of open reductions is described briefly; avenues of approach are discussed in general terms. Accompanying pictures are numerous but inadequate and without details. Many methods and splints popular in the United States are not mentioned, such as Russel traction, Hodgen's leg splint, the Jones humerus splint and the well leg countertraction splint. Skeletal traction appliances are recommended but the technic has not been described. The ensuing thirteen chapters describe the treatment of fractures of various bones. The therapy of skull fractures has been entirely omitted. The treatment of dislocation has been allotted only sixty pages, forming the second part of the book. The scope of this book is the technical side of the treatment of fractures and dislocations. It may serve as a valuable manual for French students; better books are available in the English language.

Anesthesia in Dental Surgery. By Sterling V. Mead, D.D.S., M.S., B.S. Cloth. Price, $6.50. Pp. 482, with 144 illustrations. St. Louis: C. V. Mosby Company, 1935.

This is a good book and should prove valuable, particularly to undergraduate students and practitioners of dentistry. There are thirty-two chapters. The chapters on the history of general and local anesthesia are well written and will be useful for purposes of reference.

Anesthesia is essentially a clinical subject, and, while a foundation of general medical training is of prime value, one learns the art of anesthesia by practical experience. The author properly emphasizes the necessity of ample knowledge and experience before assuming the responsibility of administering either local or general anesthetic agents. Under the heading "Legal Responsibility" he says: "The right to administer an anesthetic, whether by a physician or a dentist, depends entirely upon the possession of the requisite knowledge, skill and experience. A dentist undoubtedly has the right to administer anesthetics in his practice if he is competent to do so. But a dentist has not the right to administer anesthetics unless he is familiar with their effects and can show his proficiency in this respect." In line with this declaration one may properly ask

two questions: Should any one not competent to make an intelligent physical examination administer anesthetics? Or, again, Should any one administer a general anesthetic in his office, with only a nonmedical assistant, except, perhaps, in cases of emergency? The rather widespread practice of dentists administering nitrous oxide in the office without a full knowledge of the patient's general condition, and without the knowledge or means of meeting accidents incident to anesthesia, may be questioned. In these times of good hospitals and expert anesthetists, the dentist may relieve himself of moral and legal responsibility by employing them. It is no more a hardship on the patient to pay the ordinary fee for this service than the fee for other minor surgical operations.

In skilful hands local anesthesia should reduce the use of nitrous oxide in dental practice to an irreducible minimum. Except in cases of certain acute infections, young children and highly nervous individuals, who prefer a general to a local anesthetic, local anesthesia in oral surgery is simpler, safer and much more satisfactory, viewed from any angle. In short, the use of local anesthesia is advised only in the office, and general anesthesia only in the hospital.

The use of sedatives preceding a general anesthetic is merely a part of the problem of responsibility. The author meets these facts in a fair and honest manner. One is compelled to disagree with the author in advising the use of nitrous oxide for children, especially young children; surgeons and anesthetists will largely agree that ether is the anesthetic of choice for children. On page 62, 93 per cent nitrous oxide and 7 per cent oxygen is recommended for children during the period of induction; this is high even for an adult. Attention is called to "bridging." This is due to a lack of oxygen and should be regarded as a sign of danger.

Chapters 18 to 32 cover the subject of local anesthesia in a comprehensive and satisfactory manner. The entire text has been prepared with a good sense of fidelity to principles and details and should meet with a wide circulation.

Archiv und Atlas der normalen und pathologischen Anatomie in typischen Röntgenbildern: Die theoretischen Grundlagen und Möglichkeiten der röntgendiagnostischen Weichteiluntersuchung. Von Dr. Adolf Zuppinger, Assistent am Röntgeninstitut der Universität Zürich. Fortschritte auf dem Gebiete der Röntgenstrahlen, Ergänzungsband XLVIII. Herausgegeben von Prof. Dr. Grashey. Paper. Price, 16 marks. Pp. 99, with 46 illustrations. Leipzig: Georg Thieme, 1935.

The authors have made an elaborate study of the photographic and other physical bases underlying the possibility of demonstrating soft tissue detail in the roentgenogram. The discussions on photographic emulsions, the spectrum of diagnostic rays and the quantitative factors in the choice of diagnostic radiation are carefully elaborated. The various other factors, such as the choice of tubes, use of compression, focus skin distance, use of filters for eliminating secondary radiation and the back fire radiation from the film mounting receive adequate attention. Examples are given of roentgenograms of esophageal varices, the soft tissues of the pharynx, the hypopharynx and the epipharynx. A few pages are devoted to roentgenography of the mammary gland. Probably at this time the most important field for soft tissue radiography is the larynx and hypopharynx. The book is essentially technical, and the explanations employ free use of higher mathematics. Most radiologists have a practical experience in soft tissue demonstration and succeed to a degree. No doubt a thorough understanding of the principles put forth in this book will considerably amplify the field of soft tissue roentgenography.

Disorders of the Blood: Diagnosis, Pathology, Treatment and Technique. By Lionel E. H. Whitby, C.V.O., M.C., M.D., Assistant Pathologist, the Bland-Sutton Institute of Pathology, London, and C. J. C. Britton, M.D., Assistant Pathologist, the Christchurch Hospital, New Zealand. Cloth. Price, $7. Pp. 543, with 65 illustrations. Philadelphia: P. Blakiston's Son & Co., Inc., 1935.

This book is a thoroughly up-to-date presentation of hematology in both its scientific and its practical aspects. It is lucid and simple in its manner of presentation and yet comprehensive enough in its scope to meet demands of almost any physician who should be interested in the blood and blood-forming organs. It is adequately illustrated both in black and white and in colored plates. It is well organized and exceedingly well balanced. Each subject is concisely but adequately treated and the important phases of the subject are well outlined. The recent medical literature has been digested and assimilated and the reader will find a representative bibliography after each chapter. The chapter on anemias in infancy and childhood is particularly well done. Although it is a short chapter it is one of the most rational discussions of the subject that can be found in any textbook of hematology. It is highly recommended as well balanced and authoritative and it should meet the needs of most physicians and students.

Medicolegal

Silicosis: Liability of Employer for Silicosis and Tuberculosis Contracted by Employee.—Curtis operated a rock crushing machine for the Allen Gravel Company from April 1 to November 1930. During the dry times when the machine was being operated, large quantities of dust were created by the crushing of the rock, and employees who worked around this machine had their eyes, mouths, and noses affected thereby. After Curtis had been working there a few months he developed a cough and experienced pains in the chest. He finally procured medical attention and abandoned the particular employment. However, he gradually grew worse, and the physician diagnosed his condition as tuberculosis brought on by silicosis. Curtis sued his employer and obtained judgment, from which the employer appealed to the Supreme Court of Mississippi, division B.

The rule is, said the court, that the employer must use reasonable care to provide a safe place for his employees to work. He is not an absolute insurer of the safety of the place, nor is he required to use the highest degree of care; but he should take reasonable precautions to make the place of work reasonably safe. The medical testimony, continued the court, was ample to show the dangers incident to the inhalation of silica dust and the general recognition of such dangers by the medical profession. The public is interested in the preservation of health, and when others engage in business for profit which is dangerous to the health of employees, reasonable care should be taken to minimize the dangers. The employer in this case, apparently, did not furnish his employees with respirators or other appliances to reduce the hazards incident to the employment. Where simple devices may be obtained, the court said, at a reasonable cost, the employer should procure them for the protection of his employees. While the employer does not have to use all the latest devices that may be obtainable, he should exercise care to make the place safe, using reasonable care as a standard. The jury was warranted, in the opinion of the court, in finding that there was negligence on the part of the employer. The judgment for the employee was therefore affirmed.—*Allen Gravel Co. v. Curtis (Miss.), 161 So. 670.*

Occupational Diseases: Combined Sclerosis Attributed to Zinc Poisoning Not an Occupational Disease.—The plaintiff in the course of his employment in the defendant's chemical plant was exposed to dust incident to the manufacture of zinc stearate dusting powder. Attributing a combined sclerosis from which he subsequently suffered to the inhalations of zinc stearate dust, he sued his employer. The trial court overruled the defendant's demurrer to the evidence and entered judgment for the plaintiff.

On appeal, the Supreme Court of Missouri said that the question to be determined was whether there was evidence tending to prove that combined sclerosis—a degenerative process of the spinal cord—from which the experts testified that the plaintiff was suffering was an occupational disease under the Missouri occupational disease act. An occupational disease, said the court, within the meaning of the act, as well as at common law, is one that is "peculiar" or "incident" to the work or process carried on. "Such a disease is defined to be a disease contracted in the usual and ordinary course of events, which, from the common experience of humanity, is known to

be incidental to a particular employment. It ordinarily results from long-continued work in the particular employment." *Lovell* v. *Williams Bros.* (Mo. App.) 50 S. W. (2d) 710. In the case here abstracted, the plaintiff testified that he was in good health when he went to work for the defendant. During the last six months of his employment he was engaged in making zinc stearate dusting powder. He coughed a great deal, "emitting white stuff 'like talcum powder.'" His throat and lungs were sore, his arms hurt, and his hands "were without feeling." His stomach became swollen and he could eat very little. He walked with difficulty and, after he left the defendant's employment, he could not move for a time. He was in a hospital twice for treatment and, according to the medical testimony, while there he was treated for locomotor ataxia. A physician specializing in mental and nervous diseases, called by the plaintiff, testified that the plaintiff was suffering from a nervous disorder consisting of a degeneration of the posterior columns of the spinal cord and known as combined sclerosis, which "could be due to absorption of zinc." He further testified, however, that he had never had a patient who had contracted combined sclerosis from zinc poisoning and did not know what amount of exposure or absorption would be necessary to produce the condition. He further testified that certain abnormalities which he found in the plaintiff and on which he rested his opinion that the plaintiff had combined sclerosis were cardinal symptoms of locomotor ataxia, such as an absence of the knee jerks, slight reaction of the pupils to light, and an ataxic gait. Another specialist in mental and nervous diseases testified that the plaintiff was suffering from combined sclerosis but did not definitely attribute the condition to any particular cause. Medical witnesses testifying for the defendant denied that the plaintiff had combined sclerosis and attributed his condition to locomotor ataxia.

In reviewing the evidence, the Supreme Court could find no testimony to the effect that combined sclerosis is an illness or disease peculiar or incident to the work or process carried on. In substantiation of this conclusion drawn from the evidence, the court pointed out that in the report of the Committee on Standard Practices in the Problem of Compensation of Occupational Diseases of the Industrial Hygiene Section of the American Public Health Association (1931), containing a history of the extension of the workmen's compensation laws to include occupational diseases, there are many schedules of occupational diseases, but combined sclerosis is not listed in any schedule of any state or country. In the opinion of the Supreme Court, therefore, the trial court should have sustained the demurrer to the evidence because there was no testimony that the disease which the plaintiff contracted was peculiar or incident to his work. The judgment of the trial court was therefore reversed and the cause remanded for a new trial.—*Wolf v. Mallinckrodt Chemical Works (Mo.), 81 S. W. (2d) 323.*

Workmen's Compensation Acts: Strangulation of Pre-existing Hernia Attributed to Strain.—The employee had suffered from an irreducible hernia for several years but had worked regularly and had experienced little trouble from his condition. He was employed as a craneman and during the process of repairing a broken crane he "strained or twisted" himself, a strangulated hernia developed, and he died eleven days later. His widow instituted proceedings under the workmen's compensation act of Maryland. The state industrial accident commission denied compensation and, from a judgment of the circuit court reversing the order of the commission, the employer and its insurance carrier appealed to the Court of Appeals of Maryland.

The main controversy involved whether the injury was accidental within the meaning of the workmen's compensation act. A twist of a part of the human body, said the court, while engaged in the performance of some physical labor implies a sudden, unforeseen and unnatural bodily position or movement or muscular distortion that generally occurs without anticipation. The twist that was inflicted on the employee in the course of his work was not a natural result that could fairly be assumed to have been intended or expected. It was produced by a sudden, unintended movement of a heavy chain he was holding which caused the affected parts of his body to be forced or thrown from a normal state into a hurried, unexpected and unnatural or distorted position. If the lifting and holding of a heavy chain under difficult, insecure and unusual conditions should cause a rupture, the injury would, in ordinary acceptation, be described as an accident. The conclusions that the strangulated hernia, the court said, was the result of an accidental injury is supported by a number of decisions. Schneider's Workmen's Compensation (2 Ed.) Sections 200, 335. The old hernia with which the employee was suffering for some years before the accident was not the hernia for which compensation was claimed. The compensable injury was a strangulated hernia, which did not exist before the accident but which was directly caused by the accident. This strangulated hernia caused the employee's death and, where death ensues, there is no basis for the determination of the proportionate disability attributable to an old hernia and to the later strangulated hernia.

The court, therefore, affirmed the judgment of the circuit court for the claimant.—*Ross v. Smith (Md.), 179 A. 173.*

Dental Practice Acts: Revocation of License Without Personal Service on Nonresident Licentiate.—The board of dental examiners of West Virginia revoked the license of a dentist, presently residing in Ohio. The circuit court, on the ground that no notice of the revocation hearing was personally served on the dentist, set aside the revocation order on the condition that the dentist appear before the board on a certain day to defend the charges against him. Both the dentist and the board appealed to the Supreme Court of Appeals of West Virginia.

A revocation proceeding, said the Supreme Court of Appeals, is in effect an in rem proceeding, and personal service on a nonresident is not requisite to jurisdiction; service of notice by publication is sufficient. The circuit court, therefore, erred in its ruling to the contrary. But, continued the court, the record in this case certified by the clerk of the circuit court contained no copy of any sort of notice to the defendant. The record did contain a recital that the hearing before the board was had "at the time and place appointed in the notice." The recital does not show to whom, or the manner in which, that notice was given. While the presumption arises that the members of the board, being public officers, performed their duty and that the notice referred to in the record was the notice required by the dental practice act, the Supreme Court of Appeals thought that the ends of justice would be better met by returning the case to the circuit court to afford the board an opportunity to supply for the record a copy of the notice referred to in the recital. The judgment of the circuit court was therefore reversed and the cause remanded.—*Board of Dental Examiners v. Hedrick (W. Va.), 179 S. E. 809.*

Society Proceedings

COMING MEETINGS

American Association for the Study of Neoplastic Diseases, Baltimore, Dec. 19-21. Dr. Eugene R. Whitmore, 2139 Wyoming Avenue N.W., Washington, D. C., Secretary.

American Student Health Association, New York, Dec. 27-28. Dr. Harold S. Diehl, University of Minnesota Medical School, Minneapolis, Secretary.

Eastern Section, American Laryngological, Rhinological and Otological Society, Newark, N. J., Jan. 3. Dr. Henry B. Orton, 24 Commerce St., Newark, N. J., Chairman.

Middle Section, American Laryngological, Rhinological and Otological Society, Milwaukee, Jan. 11. Dr. William E. Grove, 324 East Wisconsin Avenue, Milwaukee, Chairman.

Mid-Western Section, American Laryngological, Rhinological and Otological Society, St. Louis, Jan. 15. Dr. Harry W. Lyman, Carleton Building, St. Louis, Chairman.

Puerto Rico, Medical Association of, Santurce, Dec. 13-15. Dr. Euripides Silva, Ave. Fernandez Juncos, Parada 19, Santurce, Secretary.

Society of American Bacteriologists, New York, Dec. 26-28. Dr. I. L. Baldwin, College of Agriculture, University of Wisconsin, Madison, Wis., Secretary.

Society of Surgeons of New Jersey, Jersey City, Jan. 15. Dr. Walter B. Mount, 21 Plymouth St., Montclair, Secretary.

Southern Section, American Laryngological, Rhinological and Otological Society, Jackson, Miss., Jan. 18. Dr. Robin Harris, Lamar Building, Jackson, Miss., Chairman.

Southern Surgical Association, Hot Springs, Va., Dec. 10-12. Dr. E. W. Alton Ochsner, 1430 Tulane Ave., New Orleans, Secretary.

Western Section, American Laryngological, Rhinological and Otological Society, Del Monte, Calif., Feb. 1-2. Dr. Carroll Smith, Paulsen Building, Spokane, Wash., Chairman.

Western Surgical Association, Rochester, Minn., Dec. 6-8. Dr. Albert H. Montgomery, 122 South Michigan Boulevard, Chicago, Secretary.

Current Medical Literature

AMERICAN

The Association library lends periodicals to Fellows of the Association and to individual subscribers to THE JOURNAL in continental United States and Canada for a period of three days. Periodicals are available from 1925 to date. Requests for issues of earlier date cannot be filled. Requests should be accompanied by stamps to cover postage (6 cents if one and 12 cents if two periodicals are requested). Periodicals published by the American Medical Association are not available for lending but may be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

Titles marked with an asterisk (*) are abstracted below.

Archives of Internal Medicine, Chicago

56: 627-832 (Oct.) 1935

Etiology and Treatment of Sprue: Observations on Patients in Puerto Rico and Subsequent Experiments on Animals. W. B. Castle, Boston; C. P. Rhoads, New York; H. A. Lawson, Providence, R. I., and G. C. Payne, San Juan, Puerto Rico.—p. 627.

*Clinical Experience with Derivative of Squill. J. G. Carr and J. D. Mayer, Chicago.—p. 700.

Effect of Digitalis on Cardiac Output of Persons with Congestive Heart Failure. B. Friedman, New York; G. Clark, H. Resnik Jr., and T. R. Harrison, Nashville, Tenn.—p. 710.

Pathology of Vessels of Pulmonary Circulation: Part III. O. Brenner, Birmingham, England.—p. 724.

*Pulmonary Abscess and Pulmonary Gangrene: Analysis of Ninety Cases Observed in Ten Years. B. S. Kline and S. S. Berger, Cleveland. —p. 753.

Treatment of Cardiovascular Syphilis: Study of Duration of Life in Eighty Treated and Untreated Patients with Aortic Aneurysm and Aortic Regurgitation. E. K. Stratton, San Francisco.—p. 773.

Relation of Asthma to Sinusitis, with Especial Reference to Results from Surgical Treatment. R. A. Cooke and R. C. Grove, New York. —p. 779.

*Pyothorax Due to Fusospirochetal Infection. R. A. Flack, Lafayette, Ind.—p. 790.

Progress in Internal Medicine: Gastro-Enterology in 1934. G. Cheney, San Francisco.—p. 797.

Clinical Experience with Derivative of Squill.—Carr and Mayer studied the effect that a derivative of squill (scillonin) had on 104 patients having cardiac decompensation. They observed that the drug will produce the usual therapeutic and toxic effects of digitalis in the treatment of cardiac decompensation. In their experience, cardiac irregularities are likely to be the first signs of dangerous intoxication. Nausea does occur and may precede the appearance of cardiac irregularities. The nausea of scillonin intoxication is significant in that it appears to signify a more advanced grade of intoxication than that associated with the nausea of digitalis. When nausea and cardiac irregularities occur in the course of treatment with scillonin, the drug should be discontinued. Slowing of the cardiac rate to 60 or below is frequent with the successful use of scillonin. The onset of a rate as low as 60 is significant of the full therapeutic dose and calls for temporary discontinuance. A dose of from 8 to 12 mg. of scillonin of standard potency as now provided, depending on the weight of the patient, may be given within four days to patients who are known to have taken no drug of the digitalis group within two weeks. If a prior course of scillonin or of some other drug of the digitalis group has been used with full therapeutic effect, the maximal dosage of scillonin should not be repeated within a month, but small doses may be given daily until the effect appears. The maintenance dose of scillonin is approximately 0.5 mg. daily, but it must be adapted to the needs and response of the individual patient. A few patients have been kept on a small daily ration for three years or more. For small patients the daily maintenance dose is as low as 0.33 mg. Scillonin therapy is of advantage to certain persons who take digitalis with difficulty because of gastric distress early in the course of medication. It is not a substitute for digitalis in the presence of frank digitalis intoxication. Scillonin retains its potency over a long period. A supply in the authors' possession for about seventeen months proved as effective at the end of that time as the lots assayed recently.

Pulmonary Abscess and Pulmonary Gangrene.—During the last ten years at Mount Sinai Hospital, Kline and Berger observed fifty-five cases of pulmonary spirochetosis (Miller-Vincent's infection of the lung), including thirty-nine cases of pulmonary gangrene, as well as twelve cases of bronchogenic pulmonary abscess and twenty-three cases of embolic pulmonary abscesses. The embolic pulmonary abscesses were associated with areas of suppuration elsewhere in the body and were manifestations of generalized pyemia or bacteremia. Of the local bronchogenic pulmonary lesions, gangrene was observed more than three times as frequently as abscess. Although all the cases presented the clinical picture of so-called typical abscess of the lung, usually they were readily recognized by distinguishing characteristics as cases of gangrene and abscess, respectively. Of the thirty-nine cases of gangrene, thirty-two were in adults and seven in children. Of the twelve cases of bronchogenic abscess, eight were in children and four in adults. Twenty-two cases of pulmonary gangrene followed an operation, usually performed under general anesthesia. Half the operations were on the oral cavity. This incidence emphasizes the danger of aspiration of infective material from the oral cavity. Of the patients with embolic pulmonary abscess, 96 per cent died. The mortality in cases of bronchogenic abscess was 58 per cent. In twenty-five cases of pulmonary gangrene with cavitation, the mortality was only 32 per cent. Mortality was 49 per cent in the whole group of cases, including fourteen in which there was no treatment with arsenic or only one treatment when the patient was practically moribund (within four days of death).

Pyothorax Due to Fusospirochetal Infection.—Flack reports three cases in which pyothorax accompanied severe pulmonary infection and in which fusospirochetal organisms appeared to constitute the important etiologic factor. The clinical course indicated that pyothorax associated with large numbers of fusospirochetal organisms causes certain clinical signs not encountered in the more common types of pyothorax. Diagnosis of this type of pyothorax should receive particular attention, as the treatment should be directed along lines different from the medical and surgical treatment of the more common types of pyothorax. The establishment of a diagnosis of pyothorax resulting from fusospirochetal infection may precede the proper identification of the underlying infection involving the parenchyma of the lungs and may be of great value in the true estimation of the prognosis of the case. The diagnosis in the three cases was established only after the presence of fusospirochetal organisms in the empyema fluid was observed. Attention is called to the severity of the pleural pain and to the fact that the pain persists after the development of pleural effusion. The fetid odor of the pus obtained from the pyothorax in this type of infection is considered of diagnostic importance. The author believes that this type of acute pulmonary infection is much more common than a survey of the medical literature would indicate. In the differential diagnosis of cases of acute pulmonary disease, more consideration should be given to this type of infection.

Journal of Pediatrics, St. Louis

7: 435-584 (Oct.) 1935

*Microcytic, Hypochromic (Iron-Deficiency) Anemia in Infancy and Childhood: Its Relation to Gastric Anacidity and to Simple, Achlorhydric Anemia of Adults. H. K. Faber, Camille Mermod, A. L. Gleason and R. P. Watkins, San Francisco.—p. 435.

Child Guidance in Outpatient Pediatrics: Study of Five Hundred Consecutive Patients. Mary I. Preston, San Francisco.—p. 452.

Tetany in the New-Born. C. E. Snelling, Toronto.—p. 465.

*Use of Lactic Acid Milk in Prevention of Summer Diarrhea. L. A. Scheuer, New York.—p. 468.

Evaluation of Splenectomy in Treatment of Sickle Cell Anemia: Late Results of Two Cases so Treated with Summary of Present Condition of All Reported Splenectomized Patients. J. F. Landon and H. A. Patterson, New York.—p. 472.

Encephalitis in Children: Some Etiologic and Therapeutic Considerations. K. E. Appel, Philadelphia.—p. 478.

Amaurotic Idiocy (Infantile Type of Tay-Sachs Disease): Report of Another Case in an Infant of Non-Jewish Ancestry. A. Roos, Chicago.—p. 488.

Cachexia Hypophyseopriva (Simmonds' Disease): Report of Case in an Adolescent Girl. C. A. Aldrich, Winnetka, Ill., and J. A. Walsh, Peoria, Ill.—p. 491.

Further Observations on Use of Acetarsone in Treatment of Congenital Syphilis. A. S. Traisman, Chicago.—p. 495.

Encephalography Chair for Children. C. Bradley, East Providence, R. I.—p. 512.

Institutional Mortality of the New-Born: Report of Ten Thousand Consecutive Births. W. W. Swanson, A. R. Turner and F. L. Adair, Chicago.—p. 516.

Microcytic, Hypochromic Anemia in Childhood.—Faber and his associates observed ten patients between the ages of 7 months and 2 years with anemia of the "nutritional" or "iron-deficiency" type, in whom gastric analysis after histamine

demonstrated a marked secretory defect: free acid was absent in six and low in the other four; total acidity and volume were low in all cases. The blood showed marked hypochromia and microcytosis before treatment was begun. When soluble iron was administered in adequate amounts, there was a striking immediate response with reticulocytosis and increased size of red cells (transient macrocytosis) accompanying an increase in hemoglobin. This was followed by a decline of reticulocytes, by a return to an approximate distribution of cell sizes and by a continued rise in hemoglobin. A certain number of microcytes tended to persist. Twins who at the age of about 8 months had anacidity and anemia were reexamined seven years later. One still had nearly complete anacidity and a mild degree of anemia. The other was able to produce a moderate amount of acid (though probably less than the normal minimum) and still had microcytosis, but without hypochromia. On the basis of a comparison with the normal values for later childhood and adult life, the average presumptively healthy child in the latter half of the first year and for a few years thereafter has a mild hypochromic anemia. Available figures show that at least during the first and second years children secrete small amounts of gastric juice containing a relatively small amount of acid. It is probable that in this period of life the absorption of iron from ordinary diet is difficult and might be improved by administering soluble iron as a routine measure and by taking into account the acid-absorbing (buffer) effect of milk in regulating diet. The close resemblance between "iron deficiency" anemia of infancy and childhood and the hypochromic, microcytic anemia of adults is noted.

Lactic Acid Milk in Prevention of Summer Diarrhea.—Scheuer reviews the incidence and mortality rate of summer diarrhea at the New York Foundling Hospital during the past twenty-five years (1910-1934). He observed that there was a persistence in the number of cases of summer diarrhea despite an adequate supply of clean milk with a low bacterial count. Because of the large number of marasmic cases resulting from summer diarrhea, powdered whole lactic acid milk mixtures containing only a total carbohydrate content of 7 per cent, 0.3 per cent lactic acid and a caloric value of less than 50 calories, per pound of body weight were fed to 403 infants during the summer months of 1931 to 1934. These infants were malnourished and were less than 6 months of age. Summer diarrhea did not occur among the 403 infants who were fed this type of lactic acid milk mixture.

Medicine, Baltimore

14: 323-376 (Sept.) 1935

Heat Cramps. J. H. Talbott, Boston.—p. 323.

Michigan State M. Society Journal, Grand Rapids

34: 575-644 (Oct.) 1935

President's Annual Address: Michigan and Our Profession: Yesterday and Today. R. R. Smith, Grand Rapids.—p. 575.
Acute Hepatic Insufficiency: Clinical Occurrence, Liver Function Tests and Therapy. W. A. Thomas, Chicago.—p. 581.
Abdominal Pregnancies Occurring in Detroit During 1933. C. N. Swanson, Detroit.—p. 585.
Diagnosis of Early Tuberculosis. H. S. Willis, Detroit.—p. 589.
Chronic Sinusitis in Children. F. Smith, Grand Rapids.—p. 593.
Congenital Hypertrophic Pyloric Stenosis. H. J. Vanden Berg, Grand Rapids.—p. 596.
*Treatment of Trichomonas Vaginalis Vaginitis. J. C. Smith, Detroit.—p. 598.
Factors Affecting Immunity Balance in Dermatophytosis. L. W. Shaffer, Detroit.—p. 601.
Infantile Eczema. G. Van Rhee, Detroit.—p. 604.
Skin Diseases in Industry. A. E. Schiller, Detroit.—p. 608.
Value of the Potter Type of Internal Podalic Version in Management of Persistent Posterior Occiput Cases. M. M. Jones, Pontiac.—p. 614.

Treatment of Trichomonas Vaginalis Vaginitis.—The form of treatment that Smith has been using for several months and seems to give the most satisfactory results, with no failures to date, is the following: The vagina is wiped dry of all discharge and is painted with a 1 per cent aqueous solution of gentian violet. After this has dried for a few moments, an amebicide powder mixture, suggested by Gellhorn, is blown into the vagina by means of a powder blower. The powder mixture consists of acetarsone and equal parts of kaolin and sodium bicarbonate. The average dose is 1 teaspoonful of the mixture, containing 7½ grains (0.5 Gm.) of acetarsone, and this dosage is usually doubled when treatment is given during the menstrual period or a pregnancy. The powder blower is so designed that it causes a ballooning out of the vagina, and thus the powder is deposited in all the crevices and folds of the vaginal mucosa. The treatments are given every second day and the number has varied from four or five to a dozen or more. Douches, baths and coitus are not permitted. Several stubborn cases treated by other agents have responded readily to this more recently tried method. For patients who for some reason cannot take the treatment, lactic acid is usually prescribed for douching; but vinegar is just as effective, and the author has one poor patient who completely eliminated the infection by the use of vinegar douches.

Minnesota Medicine, St. Paul

18: 631-694 (Oct.) 1935

Criteria of Operability for Goiter. E. Goetsch, Brooklyn.—p. 631.
Pulmonary Fat Embolism: Pathologic Consideration. K. Ikeda, St. Paul.—p. 636.
Megacolon: Report of Traumatic Case Treated by Left Lumbar Sympathectomy. L. H. Fowler and W. A. Hanson, Minneapolis.—p. 646.
Anal Abscess and Anal Fistula. H. W. Christianson, Minneapolis.—p. 655.
Pathologic Conditions in the New-Born. T. Myers, St. Paul.—p. 658.
Hyperparathyroidism. R. C. Webb, Minneapolis.—p. 664.

New England Journal of Medicine, Boston

213: 639-698 (Oct. 3) 1935

Development of Physical Diagnosis. J. H. Pratt, Boston.—p. 639.
Etiology of Chronic Arthritis. C. S. Keefer, Boston.—p. 644.
Some Factors in Etiology of Bright's Disease. J. P. Peters, New Haven, Conn.—p. 653.
*Etiology of Degenerative Vascular Disease. H. B. Sprague, Boston.—p. 659.
*Drug or Protein Allergy as Cause of Agranulocytosis and Certain Types of Purpura. F. T. Hunter, Boston.—p. 663.
Electrosurgical Cholecystectomy: II. Clinical Application. L. R. Whitaker, Boston.—p. 674.

Etiology of Degenerative Vascular Disease.—Sprague states that it is impossible to differentiate clearly intimal and medial processes, or to subdivide hyaline, fatty, fibrous and calcific changes from one another. Vascular disease has been attributed to the following factors: material voluntarily ingested; material involuntarily ingested, inhaled or acquired parenterally; toxic products endogenously elaborated in the body, such as occur in metabolic disorders; general strain on the vascular tree from hypertension or excessive bodily activity or local strain on special vessels from their anatomic situation or structural peculiarities, as in the pulmonary or coronary circulation; acceleration or exaggeration of the changes normally occurring in old age, chiefly dehydration, loss of muscle cells, elastic tissue and power of regeneration; deposit of lipoids and calcium salts in the cells and changes in the colloid state of the tissues; endocrine influences through hypo-activity, hyperactivity or dysfunction; influence of psychic factors and speed of modern life on vascular irritability, and climatic factors. The cause of degenerative vascular disease is unknown, but the boundaries of the problem are being progressively narrowed by the study of experimental arteriosclerosis of chemical analysis of vessels, of the properties of colloidal gels and of human biology. No theory of etiology is wholly satisfactory to explain premature death from disease of the blood vessels. Acceleration of the normal changes of age seems to be inherent in certain familial or racial groups and can be abolished only by a wide, and probably impossible, application of human genetics. Enough evidence exists to make it probable that there are controllable factors of environment, which in some cases can be altered in such ways as to delay the process of aging or change its manifestations.

Allergy as Cause of Agranulocytosis and Purpura.—Hunter cites the arguments that the agranulocytic and purpuric syndrome is a manifestation of allergy and those which have been advanced to show that it is a result of primary injury to the liver. Agranulocytosis occurs in susceptible individuals following the ingestion of aminopyrine, but in less than 10 per cent of the reported cases this drug has been proved, by further ingestion tests, to be the causative factor. Typical clinical

agranulocytosis may result from injections of arsphenamine, gold salts or foreign protein or from the ingestion of dinitrophenol. Agranulocytic purpura has been attributed to arsphenamine and to quinine; thrombopenic purpura and aplastic anemia, to arsphenamine and to gold salts; but many of these cases have been incorrectly referred to as pure agranulocytosis. In view of the difficulty of drawing definite dividing lines between various blood dyscrasias, and since arsphenamine can produce any of them, they may be manifestations of a physiologic mechanism similar to allergy, which, in turn, may be dependent on injury to the liver. There is not enough evidence in the literature or in the author's twenty-seven cases to justify the statement that injury to the blood-forming organs from the use of drugs or foreign protein occurs more frequently in allergic patients than in normal individuals, or more often in patients presenting evidence of past liver injury than in those without it. The author concludes that agranulocytosis is a syndrome rather than a clear cut clinical entity of established etiology and may be occasioned by a number of substances, such as aminopyrine, arsphenamine, gold salt, dinitrophenol and foreign protein. It, together with some allied blood disorders, probably belongs in the category of allergic phenomena and may even be conditioned by functional damage to the liver.

New York State Journal of Medicine, New York

35: 1001-1062 (Oct. 15) 1935

Pneumothorax in Pneumonia: An Appraisal. J. G. M. Bullowa, New York.—p. 1001.
Treatment of Ocular Affections with Gold Sodium Thiosulfate. I. J. Koenig, Buffalo.—p. 1019.
Trauma and Tuberculosis. E. Mayer, New York.—p. 1024.
Community Health Education. G. D. Forbes, Kendall.—p. 1031.
Vitamins and the Child. C. G. Kerley, New York.—p. 1035.
Bacillary Dysentery: Acute Fulminating Type with Marked Toxic Neutropenia. J. Felsen, New York.—p. 1037.

Philippine Journal of Science, Manila

57: 149-294 (June) 1935. Partial Index

Notes on Philippine Mosquitoes, III: Genus Culex: Groups Lophoceratomyia, Mochthogenes and Neoculex. F. E. Baisas, Manila.—p. 167.
Heterophyid Trematodes of Man and Dog in the Philippines with Descriptions of Three New Species. C. M. Africa and E. Y. Garcia, Manila.—p. 253.
Results of Bacteriologic Examination of Ice Drops Manufactured in Manila. Teresa V. Rosario-Ramirez and O. Garcia, Manila.—p. 269.
Treatment of Human Beriberi with Crystalline Antineuritic Vitamin. A. J. Hermano and F. Eubanas, Manila.—p. 277.
Nitrogen Distribution and Carbohydrate Partition in Philippine Rice Bran. J. Marañon and L. Cosme, Manila.—p. 289.

57: 295-408 (July) 1935. Partial Index

Methylene Blue Reduction Test: Its Efficiency and Interpretation Under Philippine Conditions. J. B. Uichanco, Manila.—p. 295.
*Mineral Constituents in Fresh and Canned Milk. A. J. Hermano and S. Claravall, Manila.—p. 323.
Breeding Habits of Anopheles Litoralis and Anopheles Indefinitus in Salt Water Ponds. W. V. King, Washington, D. C., and F. Del Rosario, Manila.—p. 329.

Mineral Constituents in Fresh and Canned Milk.—Hermano and Claravall analyzed forty-five samples of milk for their calcium, iron, phosphorus, fat and ash contents. The results for evaporated whole milk, powdered whole milk and sweetened condensed milk agree, in general, with the data given by the associates of Rogers for these products. Fresh cow's milk gave a higher percentage of ash and calcium than the natural sterilized milk. Milk from carabaos had the lowest ash content (0.64 per cent), but the ash had the highest amount of calcium (27.99 per cent). Carabao milk also had more fat and protein than the other natural fresh milks. The Toggenberg breed of goats gave milk with a higher calcium content than any other breed of goats. Whole powdered milks gave the highest percentage of fat.

South Carolina Medical Assn. Journal, Greenville

31: 167-186 (Sept.) 1935

Ischiorectal Abscess and Rectal Fistula. W. H. Prioleau, Charleston.—p. 167.
Clinical Aspects of Primary Pulmonary Carcinoma. W. A. Smith, Charleston.—p. 169.
Management of Therapeutic Malaria for Syphilitic Meningo-Encephalitis (General Paresis). J. E. Boone, Columbia.—p. 173.

Southern Medical Journal, Birmingham, Ala.

28: 867-958 (Oct.) 1935

Synovectomy of Knee Joint in Chronic Arthritis: Report of Cases. S. D. David, Houston, Texas.—p. 867.
*Treatment of Arthritis with Colloidal Sulfur: Report of Two Hundred and Fifty Cases. S. C. Woldenberg, Dayton, Ohio.—p. 875.
Congenital Solitary Kidney. R. A. Hennessey and A. D. Mason, Memphis, Tenn.—p. 881.
Hypoplastic Kidney: Report of Case Having Stone in Opposite Kidney. P. G. Gamble, Greenville, Miss.—p. 887.
Cardiospasm. R. McKinney, Memphis, Tenn.—p. 891.
Xanthoma Diabeticorum. E. Thompson, Little Rock, Ark.; E. Stevenson and F. Krock, Fort Smith, Ark.—p. 895.
Amebic Abscess of the Liver: Report of Fatal Case in Which Etiology Was First Demonstrated in Tissue Sections of Diaphragm, Following Autopsy: No Previous Manifestations of Amebiasis. Pauline Williams, Richmond, Va.—p. 902.
Unusual Tumor of Neck. W. F. Dutton and N. C. Prince, Amarillo, Texas.—p. 905.
Sacral (Caudal Block) Analgesia in Gynecology. H. V. Sims, New Orleans.—p. 908.
Agranulocytosis: Etiology, Diagnosis and Treatment. R. R. Kracke and F. P. Parker, Emory University, Ga.—p. 911.
Management of the Heart in Hypertensive Disease. O. P. J. Falk, St. Louis.—p. 915.
Treatment of Circulatory Failure. J. Kopecky, San Antonio, Texas.—p. 918.
Motor and Secretory Dysfunction of Gastro-Intestinal Tract and the Vitamin B_1 Factor: Clinical Study. J. B. Fitts, Atlanta, Ga.—p. 920.
The Problem of Rabies. W. B. Grayson and G. Hastings, Little Rock, Ark.—p. 924.
Infant Hygiene Program and Relationship of Infant Mortality to Maternal Hygiene Program: Analysis of Seven Years' Work in Williamson County, Tennessee, 1927-1933. W. C. Williams, Nashville, Tenn., and E. L. Bishop, Knoxville, Tenn.—p. 928.
Inflammation of Uterine Cervix. H. W. Kostmayer, New Orleans.—p. 931.
The Prognosis of Syphilis. C. P. Bondurant, Oklahoma City.—p. 933.
Importance of Psychiatric Examination in Evaluation of Head Injury Sequels. T. H. Harris and A. Hauser, Galveston, Texas.—p. 937.
Routine Tuberculin Tests in Children. C. V. Rice, Muskogee, Okla.—p. 942.
Food Problems in the One Child Family. M. R. Woodward, Sherman, Texas.—p. 946.
Tracheobronchial Diphtheria. H. Dupuy, New Orleans.—p. 948.
Simple Technic for Establishing Spinal Fluid Drainages. G. B. Lawson, Roanoke, Va., and O. D. Boyce, Nashville, Tenn.—p. 949.

Treatment of Arthritis with Colloidal Sulfur.—Woldenberg employed colloidal sulfur in the treatment of 231 cases of atrophic and five of hypertrophic arthritis and in fourteen cases of muscular rheumatism. Every case showed excellent clinical improvement, and the results were obtained in a much shorter period of hospitalization than previously known. All these patients except six were discharged from hospitalization with a complete arrest of the active symptoms of the disease. Great care was exercised in each case in establishing the diagnosis of arthritis. The familiar symptoms were confirmed by a thorough examination of the nature of the inflammation and the tenderness complained of in the affected joints. In addition, the diagnosis was confirmed by roentgen studies of each joint in which any change had occurred, and in every case of arthritis in this series abnormal shadows showed extraordinary joint alterations. Coexisting diseases were found in many of these patients. All foci of infection when present were cleared up as far as possible. The routine eradication of teeth and tonsils was not done unless it was apparent that they were factors in the causation of the arthritic process. Protective and corrective treatment was carried out whenever indicated. Chronic constipation, an extremely common condition among these patients, was corrected. While anemia, as shown by low hemoglobin and a slight reduction of the red cells, was mostly mild, the best nutritional state possible was secured for each patient. Generally they were placed on a high vitamin, low carbohydrate, low calory diet, with 50 or 60 Gm. of protein and the necessary amount of fats according to the patient's caloric requirements. Exercises gradually increasing in vigor were given daily throughout the treatment. The colloidal sulfur used was supplied in 2 cc. ampules said to contain 10 mg. of colloidal sulfur disbursed in a protein-free aqueous medium for intravenous medication and in 2 cc. ampules containing 20 mg. of colloidal sulfur suspended in an acid-free olive oil for intramuscular medication. In the severe type and long standing cases, showing a low cystine content of fingernail clippings and a high sedimentation rate, 30 mg. of sulfur was

given every day until a course of ten injections had been completed. The more satisfactory results were obtained from the intravenous medication. The majority of the patients were free from pain after the fifth or sixth injection and the spasticity of muscles began to disappear. The effusion in the joints gradually became less, and after about three or four weeks of treatment it was practically gone. Great care was taken when giving colloidal sulfur intravenously to inject it slowly, to prevent any leakage into the soft tissue, as the latter causes excruciating pain and sometimes sloughing of the soft part at the vicinity of the point of injection. In the most recent cases, the cystine and sedimentation tests, supported by the clinical observations, have enabled the author to treat very acute cases with doses as high as 30 mg. of colloidal sulfur intravenously daily for a full course, and as a result completely ridding the patients of the intense pain they were suffering within thirty-six hours of the first injection. It is his opinion that the larger doses administered at more frequent intervals are the most important factor in the beneficial results obtained with sulfur therapy in arthritis.

Surgery, Gynecology and Obstetrics, Chicago

61: 433-584 (Oct.) 1935

*Chronic Atrophic Dermatitis of Vulva. F. L. Adair and M. E. Davis, Chicago.—p. 433.
Phlebitis, Thrombosis and Thrombophlebitis of Lower Extremities. L. M. Zimmerman, Chicago.—p. 443.
Conservative and Radical Measures in Treatment of Ulcer of Leg: Study of Technics, Indications and Results. B. Douglas, Nashville, Tenn.—p. 458.
Study of Relationship of Pregnancy to Disease of Gallbladder. R. R. Huggins, B. Harden and G. W. Grier, Pittsburgh.—p. 471.
*Peptic Ulcer: Experimental Study. E. E. Blanck, Chicago.—p. 480.
Tissue Diagnosis During Operation: Reliability of Terry's Supravital Technic in One Thousand and Thirty Biopsies. C. A. Hellwig, Wichita, Kan.—p. 494.
Method of Closure of Temporary External Fecal Fistula. H. W. Cave, New York.—p. 499.
*Surgical Treatment of Joint Tuberculosis. M. Cleveland, New York.—p. 503.
Medical Treatment of Amebic Infections of Liver. W. H. Holmes, Chicago.—p. 521.
Pineal Teratomas: Report of Case of Operative Removal. A. J. McLean, Portland, Ore.—p. 523.
Loss of Urinary Control Associated with Relaxation of Vesical Neck: Modified Technic for Its Treatment. M. Douglass, Cleveland.—p. 534.
Significance of Bleeding or Discharge from the Nipple. J. E. Stowers, Kansas City, Mo.—p. 537.
Obstetric Analgesia with Pentobarbital Sodium: Leukocyte Response During the Puerperium. H. M. Teel and D. E. Reid, Boston.—p. 545.

Chronic Atrophic Dermatitis of Vulva.—Adair and Davis state that the present terminology—kraurosis, leukoplakic, vulvitis, leukokraurosis—is unsatisfactory, as it describes only certain phases of this condition. It leads to failure in making a diagnosis of the early stages of the disease prior to the development of the shrinkage of kraurosis or the white areas of leukoplakia. Chronic atrophic dermatitis of the vulva is a simple and descriptive term for the entire process in its various manifestations. In a period of five years the authors have encountered twenty-three patients with typical chronic atrophic dermatitis of the vulva, an incidence of 0.24 per cent. Vulvectomy was done in nine cases with uniformly good results. Various types of treatment were given, including irradiation in the majority of the cases, with only temporary relief. The disease is progressive and does not tend to regress spontaneously, although there may be periods of quiescence. Surgical removal of the involved tissue is the only safe, logical and effective treatment in alleviating the symptoms and arresting the progress of the disease. The condition is to be regarded as a precancerous lesion, with an incidence of carcinoma in more than 50 per cent of the cases. Vulvectomy is further justfied as a prophylactic measure against carcinoma of the vulva.

Experimental Peptic Ulcer.—Blanck shows that gastrointestinal ulceration can be prevented in dogs with biliary exclusion by the adequate feeding of fresh bile obtained from dogs. Gastritic changes were observed in the pyloric region in three dogs. Another characteristic of the associated gastritis as observed in man and in the animals was the patchy distribution of the pathologic areas. The destruction of the epithelium of the surface and necks of the pyloric glands constituted the earliest type of alteration in these glandular structures. Cystic dilatation of some of the glandular structures was noted in the necks of pyloric glands of one dog and in Brunner's glands of the duodenum in another dog. In the fundus mucosa of one dog an increase in the amount of interstitial tissue resulting in a forcible separation of the closely packed gland tubules was observed. There was also a destruction or atrophy of the glandular cells manifested first in the necks of the glands and then in the fundus portions. In the regions in which the process had progressed sufficiently to destroy entire tubules, there often could be seen one or more nests of from one to six parietal cells lying as vestiges in the path of the destructive process. These cells presented intact cell outlines and perfectly normal appearing nuclei. In the changes observed in the duodenums of the animals there was chiefly a loss of epithelium covering the villi. In some areas there was in addition a beginning erosion of the tips of the intestinal villi. The sections stained in muchematein solution, as long as any portion of the cell cytoplasm remained, continued to give the characteristic staining reaction, confirming the work of Whitlow that mucus laden and mucus covered cells are more resistant to acid-pepsin digestion than other cells. Although these cells possess a natural power of protection, they finally succumb to the influences of the destructive process. Of the changes occurring on both sides of the pyloric ring, those on the stomach side are progressive and constitute chiefly a loss or atrophy of the gland structures, and on the intestinal side of the pyloric ring the changes are manifested by a continual loss of tissue. The author believes that this fact explains why there is a preponderance of the duodenal lesion over the gastric lesion in peptic ulcer disease.

Surgical Treatment of Joint Tuberculosis.—Cleveland believes that tuberculosis of the joint as a distinct entity does not exist. Manifestations of tuberculosis in the joints must be considered as tuberculosis with a primary focus in the lungs, lymph glands or tonsils, in which the joint has been secondarily invaded. The condition of the lungs, upper respiratory tract, gastro-intestinal tract and genito-urinary tract is of paramount importance in these cases, which must be studied as a whole in relation to the tuberculous infection. Until each series of cases reported with joint tuberculosis is so studied, exact knowledge of the problem of treatment or prognosis cannot be arrived at. In the author's 210 patients the average age of onset was 22 years. The mortality was 28.5 per cent and will undoubtedly be higher as time goes on and the number of deaths is augmented from the list of cases that he considers uncertain. In the first decade of life the mortality in this group was only 14.8 per cent, but in the third decade the mortality mounted to 46 per cent. Patients with positive sputum and caseous pneumonic lesions, and those with pulmonary disease and negative sputum, but with metastatic spread to other organs, have shown a mortality of 52 per cent. On the other hand, patients with inactive pulmonary disease and no metastatic spread to other organs and those with no evidence of pulmonary disease have shown a mortality of only 9 per cent. A factor that adversely influences the end result is prolonged suppuration from sinuses with resulting amyloid disease. The only joints that tend to fuse spontaneously are those of the spine. This occurs in only 22 per cent of the cases and then only after many years and the development of tremendous deformity. A study of the end results of the 224 joints treated shows that the joints of the upper extremities and the tarsal and ankle joints had the highest percentage of excellent results, 70 per cent or better. The knee joint cases showed 61 and the spine cases 54 per cent of excellent results. The percentage of excellent results fell to 44 in the hip joint cases and to 37.5 in the sacro-iliac joint cases. As the excellent results declined, the mortality rose. The sacro-iliac joint with a mortality of 43.5 per cent is, in the author's experience, the gravest form of joint tuberculosis, while the knee joint and joints of the upper extremities offer the best prognosis. The operative treatment aimed at eliminating the surgical focus by putting the joint or joints involved at complete rest, by operative fusion. If a joint of an extremity was overwhelmingly involved and any attempt to save it endangered the patient's life, amputation was resorted to.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

Brain, London

58: 323-426 (Sept.) 1935

The Origin of the Berger Rhythm. E. D. Adrian and K. Yamagiwa.—p. 323.
Observations on Terminations of Cutaneous Nerves. H. H. Woollard.—p. 352.
Chronic Progressive (Endotoxic) Polyneuritis. W. Harris.—p. 368.
Visual Disorientation in Homonymous Half Fields. G. Riddoch.—p. 376.
Certain Anatomic and Physiologic Aspects of Meninges and Cerebrospinal Fluid. L. H. Weed.—p. 383.
Traumatic Lesions of Optic Chiasma. H. M. Traquair, N. M. Dott and W. R. Russell.—p. 398.
*Reactions of Dog After Removal of Cerebral Hemispheres. S. I. Lebedinskaia and J. S. Rosenthal.—p. 412.

Experimental Removal of Cerebral Hemispheres.—Lebedinskaia and Rosenthal removed the cerebral hemispheres of a young male dog by two successive operations carried out without great loss of blood and without damaging the subcortical matter. They found that a small portion of cerebral cortex is sufficient for the establishing of simple conditioned reflexes. Motor disturbances pass away almost completely in the course of time. The sleep is deeper and sounder than that of normal dogs, owing to the absence of the cerebral cortex, which is a more sensitive mechanism to internal and external stimuli than the subcortical matter. The internal functions of the organism (metabolism, temperature regulation) depending on the subcortex remain satisfactory. The dog lost sight and smell. Taste remains more or less normal. Cutaneous sensibility to mechanical and thermal stimuli is lowered. The unconditioned orientation reflex to sounds and noises is preserved. Explorations (investigatory movements of the head) are preserved and can be easily mistaken for olfactory reactions, which in reality are absent. The mating (sex) instinct may be preserved but incompletely. The dog was unable to find his food without assistance. Fits or convulsions of the tonic type were not observed. The dog lived without cerebral hemispheres for one year and two days after a third fit of convulsions. At necropsy, the dura mater was found adhering closely everywhere to the remnants of the brain tissue. It was very much thicker than normal, especially at the posterior part near the tentorium cerebelli, as well as along the middle line above the fissura cerebri magna, where the thickness of the scar exceeded 1 cm. On its internal surface the dura mater adhered closely to the surface exposed by the removal of the cerebral hemispheres. Scars were found in front, in the region of the olfactory lobes, which were destroyed by the operations. All the nerves of the base of the brain were intact and were not adherent to scar tissue. Transversal sections made from the medulla oblongata to the front end of the tractus olfactorius at a distance of from 2 to 3 mm. from one another have shown that: 1. The lower posterior horn of the left lateral ventricle was absent to the middle of the thalamus. 2. In that part the dura mater modified by the scar adhered directly to the subcortical matter. 3. Owing to the secondary scar formations, the cornu ammonis on the left was hardly discernible. 4. In front of their middle parts, both lateral ventricles were intact and descended together with the fornix toward the front part of the base of the brain. 5. The right gyrus pyriformis was intact, the left was damaged. 6. Near the right gyrus pyriformis a well preserved portion of the auditory area of the cortex-gyrus compositus posterior was found.

British Medical Journal, London

2: 609-650 (Oct. 5) 1935

General Ideas in Medicine. W. Trotter.—p. 609.
Some Aspects of Infant Feeding. H. B. Graham.—p. 614.
Gas Anesthesia Under Positive Pressure. G. Kaye.—p. 618.
Advances in Our Knowledge of Hydatid Disease During Twentieth Century. H. R. Dew.—p. 620.
*Agranulocytosis with Purpura Haemorrhagica Following Gold Therapy: Note on Prevention of Complications. P. Ellman and J. S. Lawrence.—p. 622.

Agranulocytosis Following Gold Therapy.—Ellman and Lawrence present a fatal case of hemorrhagic purpura with agranulocytosis following gold therapy. They divide the complications of gold therapy into effects on the skin, the mucous membrane, the liver and kidneys and the hematopoietic system. They emphasize that, apart from a few cases of degenerative hepatitis, accidents due to gold therapy have proved fatal only when the hematopoietic system has been involved. Émile-Weil and Bousser consider the causation of toxic manifestations due to a sensitivity to gold. The most effective treatment of agranulocytosis is blood transfusions repeated as often as is found necessary. Subcutaneous injections of blood have also been used, and epinephrine and liver by mouth. Dextrose intravenously, sodium thiosulfate or magnesium and sodium nucleinate are also recommended. Before starting gold therapy the patient should always be questioned with regard to a personal or family history of purpura or bleeding. Gold salts should not be given to patients with such a history. They should likewise not be given following substances that affect the bone marrow, such as thorium. Blood counts should be carried out frequently during the treatment in order to detect an incipient agranulocytosis, aplastic anemia or thrombocytopenia. The necessity for this in the gold treatment of rheumatoid arthritis cannot be overemphasized. If the eosinophil count rises above 5 per cent, the injections should be discontinued temporarily. As erythema is a sign of intolerance to gold, the authors discontinue the injections when it occurs. On recommencing, half the previous dose is employed.

Edinburgh Medical Journal

42: 505-568 (Oct.) 1935

The Teaching of the Neuroses to Medical Students. T. A. Ross.—p. 505.
Acrodysplasia: Type: Syndactylic Oxycephaly. D. M. Greig.—p. 537.

Irish Journal of Medical Science, Dublin

No. 117: 537-572 (Sept.) 1935

Evaluation of Intrapleural Pneumolysis. G. Maurer.—p. 537.
Tay-Sachs' Disease (Amaurotic Family Idiocy): Review of the Disease with Description of Case. R. E. Steen.—p. 547.
Hay Fever Immunization (Personal Experience). E. O'Shaughnessy.—p. 554.

Medical Journal of Australia, Sydney

2: 367-396 (Sept. 21) 1935

Treatment of Acute Anterior Poliomyelitis in Early Stages. R. Southby.—p. 367.
Early Treatment of Poliomyelitis. Jean Macnamara.—p. 374.
Early Treatment of Anterior Poliomyelitis. J. W. Grieve.—p. 378.
Radiologic and Clinical Findings in Eight Hundred Adult Chests. E. L. Cooper and Barbara G. Wood.—p. 379.
Abdominal Adhesions. H. S. Stacy.—p. 380.
Notes on Ectopic Ureter in Female: Case Report. K. Kirkland.—p. 381.

South African Medical Journal, Cape Town

9: 585-624 (Sept. 14) 1935

Anemia: Hematologic Aspect. G. Buchanan.—p. 597.
Prevention of Deformity and Disability from Fractures of Long Bones. J. M. Edelstein.—p. 603.
Medicine and Dentistry: Inaugural Floyd Lecture. E. B. Fuller.—p. 609.

Japanese Journal of Obstetrics and Gynecology, Kyoto

18: 301-354 (Aug.) 1935

Biologic Study of Effect of Toxins of Malignant Tumor to Suprarenals, Lymphatic System and Other Organs: Parts I, II and III. S. Okamoto.—p. 302.
Kapeller-Adler's Reaction of Pregnancy. S. Okamoto and Y. Yamamoto.—p. 323.
*Electrocardiogram of New-Born: First Report. Electrocardiogram of the Normal New-Born. H. Hori, M. Imai and M. Satô.—p. 325.
Id.: Second Report. Electrocardiogram of the Asphyxiated New-Born. H. Hori, M. Imai and M. Satô.—p. 333.
Surface Tension of Tissue of Uterine Tumor. T. Kikuchi and G. Kawanishi.—p. 340.
Application of Grelan for Roentgen Sickness. H. Kawakami and K. Kominami.—p. 345.
Statistical Observation of Cephalohematoma Neonatorum. M. Oshima.—p. 347.
Labor Complicated by Deformity of Promontory. A. Yamabe.—p. 350.

Electrocardiogram of the Normal New-Born.—Hori and his associates examined the electrocardiograms of 126 mature new-born infants and thirty-four premature infants. Irrespective of the maturity or prematurity of the new-born, the preponderance of the right ventricle was proved in all the cases and every wave was lower than that in the suckling, infant or adult. The abnormal electrocardiogram was observed more frequently in the premature new-born infants, especially in those electrocardiographed on the first to the third day after birth, than in the mature infant.

Annales de Médecine, Paris

38: 213-308 (Oct.) 1935

Dispersion of Tubercle Bacillus in Course of Human Pulmonary Tuberculosis. R. Debré and M. Perrault.—p. 213.
Expectorants and Expectoration. J. Gordonoff.—p. 248.
*Place of Carotid Sinus in Mechanism of Acute Pulmonary Edema. A. Salmon.—p. 270.
Disorders of Myocardial Function: Fractionated Systoles. R. Lutembacher.—p. 280.
Familial Hemangiomatosis of Rendu-Osler and Hepatic Cirrhosis. L. Van Bogaert and J.-H. Scherer.—p. 290.

Carotid Sinus in Pulmonary Edema.—The carotid sinus is situated in the enlargement of the internal carotid after the bifurcation of the common carotid and consists of a plexus rich in nerve fibers which connect with the bulbar nuclei and the vagus centers. According to Salmon, the functional relations of this sinus with the bulbar respiratory nucleus is also interesting. It has been shown that mechanical excitation of the sinus modifies constantly the amplitude and rhythm of respiratory movements. Thermal stimulation of this organ produces an acceleration of the same movements. Depression of the sinus results in apnea, which ceases after the removal of the depressive agent. These and other factors have value in explaining the pathogenesis of acute pulmonary edema. The connection between the sinus and the bulbar nuclei does much to explain the fact that these crises of pulmonary edema having all the characters of bulbar vagotonic phenomena are usually produced by agents affecting the sympathetic, by injections of epinephrine and by emotions, hypertensive crises, strongly painful sensations, experimental excitation of sympathetic ganglions, brain lesions resulting in irritation of the nuclei of the third and fourth ventricle and similar stimuli.

Schweizerische medizinische Wochenschrift, Basel

65: 997-1020 (Oct. 19) 1935. Partial Index

*Treatment of Fracture of External Malleolus. O. Winterstein.—p. 999.
*Pathogenesis of Thromboses. H. Wantoch.—p. 1000.
Therapy of Sympathetic Dystonias. O. Lampl.—p. 1003.
Treatment of Cardiac Neuroses and of Insomnia in Tuberculous Patients. F. Grandjean.—p. 1004.
Studies on Action of Histidine in Gastric and Duodenal Ulcer and in Related Disturbances. J. W. Konig.—p. 1006.

Treatment of Fracture of External Malleolus.—According to Winterstein, fractures of the external malleolus are especially frequent in ski runners. He shows how a fracture can be differentiated from a distortion and thinks that roentgenoscopy is usually unnecessary. In discussing the treatment, he says that some recommend small bandages and early mobilization and that others advise a plaster-of-paris cast, which remains in position for from two to six weeks and is then followed by mobilization. He concedes that the plaster-of-paris cast gives satisfactory results in most fractures but shows that prolonged functional impairment and weakened muscles are frequently the result of this treatment. With other surgeons he is of the opinion that the plaster-of-paris cast goes beyond the aim. Since 1919 his clinic has followed Clairmont's suggestion in that it employs the so-called Gradl bandage for the fractures of the external malleolus in which there is no dislocation. As soon as a definite diagnosis has been reached, a strong linen bandage, 5 cm. in width and 5 meters in length, is put on in the form of an ascending spica of the foot, beginning at the toes and going up to three fingerbreadths above the malleolus. The linen bandage is covered with a gauze bandage. The foot is placed on a small hard cushion with lateral sand bags and an ice bag. At intervals of several hours, the bandage may be moistened with cold water or with aluminum acetate. As the bandage dries, the pressure becomes more intense. According to requirement, the bandage may be removed for a time every day. Massage, which should be painless and should not touch the malleolus itself, is not begun until after at least three days. Active exercises may be begun a few days later, resistance exercises being especially helpful. Daily warm baths, the temperature of which is gradually increased, are beneficial. After about a week it is no longer necessary to keep the bandage constantly moistened. Rest in bed is necessary for a short time, but when the patient sits up it is advisable to elevate the leg. Standing and walking should at first be done without putting a strain on the leg with the fracture. In young persons this is possible after about a week, in middle aged persons after from two to five weeks.

Pathogenesis of Thromboses.—Wantoch points out that since Virchow's time most authors have accepted the theory that three factors are involved in the development of thrombosis; namely, retardation of the speed of the blood current, impairment of the vascular epithelium and changes in the composition of the blood. The author shows that opinions differ about the relative importance of these three factors, some stressing the one and some the other as the most important one. However, recently the opinion has gained ground that changes in the composition of the blood are the most important factor in the pathogenesis of thrombosis. In discussing this factor, the author evaluates the resorption of the decomposition products of protein, the condition that is produced by protein and serum therapy and the importance of injections and of diuretics. He describes the observations made in the course of postmortem examinations. At his clinic, 367 cases of fresh thrombosis and embolism were found in the course of 4,739 necropsies. After mentioning the various pathologic conditions found in these 367 cases, he asserts that there were only twenty cases in which there was no disorder that is accompanied by changes in the blood, pointing out that the composition of the blood is altered not only in the conditions in which a predisposition to thrombosis exists but also in case of transudates and of stasis. He thinks that it may be concluded with some reservations that the accumulation of fluids in the cavities and tissues of the body is connected with a tendency to thrombosis. It was found also that, the more conditions concur which have a tendency to thrombosis, the more likely is the development of a thrombosis. The author was unable to corroborate that obesity or endocrine factors play a determining part in the pathogenesis of thrombosis, and, in reviewing the opinions on the connection between thrombosis and meteorological conditions, he says that as yet nothing definite is known about this relationship.

Clinica Pediatrica, Modena

17: 661-724 (Sept.) 1935

*Skin Reaction to Histamine and to Epinephrine in Scarlet Fever. A. Colarizi.—p. 661.
Acute Hypo-Adrenalism in the New-Born. A. Martinetti.—p. 706.

Skin Reaction to Histamine and Epinephrine in Scarlet Fever.—Colarizi observed a marked refractoriness of the skin capillaries to histamine and to epinephrine in forty-two cases of scarlet fever. This lack of reactivity became less pronounced in a few days. Hypo-excitability and sometimes total loss of excitability were observed in the advanced stage of the disease in two patients presenting postscarlatinal nephritis. This study, comprising 270 cutaneous tests, threw light on the nature of the lesions of the cutaneous vessels in scarlet fever and contributed to the understanding of the Schultz-Charlton phenomenon of rash extinction. The author investigated the various phases of the reaction as manifested by the behavior of the capillaries, veins and arteries toward the pharmacodynamic substances, comparing the skin of healthy persons, of scarlatinal exanthems and of the areas of fading rash. He found that the capillaries exhibit diminished permeability (urticaria reaction to histamine) and diminished contractility (ischemic reaction to epinephrine) as much in the exanthematous area as in the area of fading rash. He states that a lack of arterial contractility (erythematic reaction) is more evident in the zone of fading rash than in the exanthematous portion. The changes in the cutaneous blood vessels to which the rash extinction is due are first observed in the arterial and venous circulation and after that in the capillary loops. The changes are due to the persistence of the lesions in the exanthematic skin. This is explained by the fact that the capillary loops are more affected by the toxic action of scarlet fever and that a certain time elapses before the walls of the capillaries recover from their lesions. The changes in the veins and in the arteries of the area of fading rash, resulting in the cessation of hyperemia, may be explained as an increase of the tonus. Although this hypertonia does not compare with the ischemia induced by epinephrine, it inhibits and limits the response to the vasodilatory stimuli. The extinction phenom-

enon always occurs as a regular round spot. The author concludes that the Schultz-Charlton phenomenon is one of the best tests of regulation of the tonus of the small cutaneous vessels.

Policlinico, Rome

42: 2031-2090 (Oct. 21) 1935. Practical Section

*Allergy to Extract of Cancer Tissue: Importance of Desensitization in Prevention of Cancer. S. Citelli.—p. 2031.
Treatment of Pulsating Exophthalmos. A. Chiasserini and A. Tommasini-Mattiucci.—p. 2034.

Allergy to Extract of Cancer Tissue.—Citelli states that the subcutaneous injection of 1 cc. of the whole extract of cancer tissue given persons while fasting produces a hemoclastic reaction in about 85 per cent of the patients suffering from cancer and in about 15 per cent of noncancerous persons (generally over 40 years old and belonging to cancerous families). The allergic condition in the last group may be spontaneous or produced by injecting intravenously, also while fasting, 8 or 10 cc. of blood serum, previously centrifugated, of either noncancerous persons with a positive test or of cancerous patients. It disappears after three subcutaneous injections given at weekly intervals. The desensitization persisted after three years in the only two patients out of a group of eleven in whom the results were verified. The test is specific for cancer. The author advises desensitization of noncancerous persons who have a positive reaction by administering three subcutaneous injections of whole extract of cancer tissue, given in doses of 8 or 10 cc. of the extract per injection at weekly intervals, as a new preventive treatment of cancer.

Prensa Médica Argentina, Buenos Aires

22: 1849-1906 (Sept. 25) 1935

Transmission of Tumors Developed by Action of Ultraviolet Radiation. A. H. Roffo.—p. 1849.
*Absence of Pericardial Murmur in Myocardial Infarct. G. Bosco.—p. 1856.
Surgical Treatment of Detachment of Retina: Safar's Technic. R. F. Pereira.—p. 1859.
Anatomoclinical Forms of Pulmonary Syphilis in Adults. D. Vivoli.—p. 1875.

Absence of Pericardial Murmur in Myocardial Infarct.—Bosco states that there are certain cases of myocardial infarct in which the pericardial murmur cannot be heard on auscultation of the heart. The audibility of the murmur depends on the topographic situation of the occluded coronary arterial branch, the intensity of myocardial necrosis, the site of development of the fibrous pericarditis that follows myocardial necrosis, and the development of the disease. The actual murmur is due to the anatomopathologic alteration of the pericardium and is audible only during the first stage of the disease, which is rather brief, and then only when there is intense necrosis of the anterior wall of the myocardium; and the seat of fibrous pericarditis that follows is accessible to auscultation on the anterior wall of the thorax. These conditions are produced only by occlusion of the anterior descending branch of the left coronary artery. When the occlusion takes place at the posterior descending branch of the right coronary artery or at any of the two circumflex branches of the right and left coronary arteries, the murmur is inaudible at auscultation.

Münchener medizinische Wochenschrift, Munich

82: 1669-1708 (Oct. 18) 1935. Partial Index

Asphyxia by Carbon Monoxide and Resuscitation with Oxygen and Carbon Dioxide. S. Y. Henderson.—p. 1672.
Endocrine Therapy of Female Sterility. H. Buschbeck.—p. 1677.
*Influence of Testis Hormone Preparations and Estrogenic Substance on Coagulability of Blood. C. Bablik.—p. 1679.
*Changes in Carotene-Vitamin A Economy in Myxedema and in Cretinism. H. Wendt.—p. 1679.
Elimination of Acetone by Diabetic Patients During Work. H. Rothkopf and K. H. Schorn.—p. 1681.
Method of Prolapse Operations. F. Orthner.—p. 1682.

Hormone Preparations and Coagulability of Blood.—Bablik cites investigators who observed that estrogenic substance promotes the coagulation of the blood and describes experiments that he made with testis hormone. He found that the testis hormone considerably retards the coagulation. Since the testis hormone retards the coagulation and estrogenic substance accelerates it, it may be assumed that, in case of an oversupply of the one or the other, the coagulability is influenced in a corresponding manner. The author thinks that this conclusion is justified also by observations on thrombosis and embolism on the one hand and on hemophilia on the other.

Carotene-Vitamin A Metabolism and Thyroid.—Wendt cites animal experiments in which it was demonstrated that the thyroid influences the vitamin A metabolism and describes his own studies on human subjects. He found that in human hyperthyroidism, in exophthalmic goiter, the examination of the serum disclosed a considerable reduction of the carotene and particularly of the vitamin A values. He says that vitamin A may be entirely absent from the serum in severe cases of hyperthyroidism. After successful treatment with iodine or by surgery, the values increase. If patients with hyperthyroidism are given large quantities of vitamin A, their weight increases and their metabolic rate recedes to almost normal values. The author investigated also the carotene and vitamin A metabolisms in patients with hypofunction of the thyroid, in myxedema and cretinism. In myxedema patients he found that the transformation of carotene into vitamin A is disturbed. In patients with cretinism the vitamin A values of the serum are considerably reduced, and it appears that this reduction is essentially a result of the transformation disturbance of carotene into vitamin A; but the lack of capacity to store vitamin A also seems to play a part in cretinism.

Zeitschrift für Kinderheilkunde, Berlin

57: 383-504 (Sept. 19) 1935. Partial Index

*Changes in Blood Chemistry in Parathyroprivic Tetany and in Administration of Parathyroid Extract. S. Siwe.—p. 383.
Acid-Base Equilibrium of Cerebrospinal Fluid in Tuberculous Meningitis. B. Wollek and Margarete Kulcsár.—p. 409.
*Hepatic Function and Significance of Takata Reaction in Disorders of Nurslings and of Small Children. S. Recht.—p. 419.
Biologic Significance of Phosphate Ester of Erythrocytes. E. Freudenberg.—p. 427.
Does Young Nursling Take a Special Position in Vitamin C Metabolism? U. Hahn.—p. 442.

Blood Chemistry in Parathyroprivic Tetany.—Siwe aimed at determining what action the hypofunction of the parathyroids exerts on the calcium and phosphorus contents of the blood and on the ultrafiltrable fractions of these substances. He also wished to see whether an increased amount of parathyroid extract in the organism would produce chemical changes that would be the exact opposite of those found in acute or chronic insufficiency of the parathyroids. He summarizes his observations as follows: 1. In acute insufficiency of the parathyroids (parathyroidectomized dogs) the total calcium content of the blood may decrease before the unorganic phosphorus has commenced to increase. 2. This indicates that the insufficiency exerts its effect first on the total calcium and later on the phosphorus content of the blood. 3. When the phosphorus increases, the total calcium does not necessarily have to show the lowest values, although the tetany may be fully developed. 4. The ultrafiltrable calcium fraction may become reduced, but it does not do so always and it never goes below the values corresponding to the amount ionized at the p_H of the blood. 5. In case of chronic insufficiency of the parathyroids in human subjects and after it, the ultrafiltrable calcium may be normal, even if the total calcium content is reduced. The organic phosphorus content is, independent of the calcium level, either normal or slightly increased and its ultrafiltrable portion is present in normal values. 6. Administration of parathyroid extract produces in rabbits an increase in the total calcium content of the blood and a considerable increase in its ultrafiltrable portion in the arterial blood. 7. The intake of parathyroid extract results also in a considerable increase of the inorganic phosphorus in the blood and of its ultrafiltrable portion in the arterial blood. 8. Here and in other experiments it is shown that the total calcium content as well as the organic phosphorus may differ in the arterial and in the venous blood. At any rate, the difference does not become greater in the case of parathyroid insufficiency and there are indications that it has a tendency to decrease following the administration of parathyroid extract. 9. For this reason the behavior of the ultrafiltrable fractions is the more surprising. Whereas under normal conditions and in parathyroid insufficiency the ultrafiltrable portion of phosphorus is not constantly different in the arterial and venous blood, since under normal conditions the ultrafiltrable calcium is slightly

higher in the arterial than in the venous blood, and although the ultrafiltrable calcium is slightly increased in parathyroid insufficiency, the differences are great in case of administration of parathyroid extract. In the latter case the ultrafiltrable calcium in the arterial blood may be twice as high as in the venous blood. The corresponding phosphorus fraction varies by 50 per cent or more in the same direction. This happens in spite of the fact that in case of the administration of parathyroid extract the variations in the total calcium and in the inorganic phosphorus are unusually small in both types of blood. 10. The addition of parathyroid extract to the serum in vitro corroborates the results of the animal experiments.

Hepatic Function and Takata Reaction in Children's Disorders.—Recht calls attention to the fact that Jegler's adaptations for the serum of Takata's original cerebrospinal fluid reaction indicate changes in the colloid chemistry of the serum. In the development of these changes the liver plays an important part, and it is generally accepted that a positive Takata reaction indicates severe hepatic lesions. To be sure, in nurslings and small children the disorders for the detection of which the Takata reaction is used in adults are rare. If the finer changes in the hepatic function that occur in nurslings and children are to be detected with the Takata reaction, mere positivity or negativity of the reaction is not sufficient. The author gained the impression that not the quantity of the precipitate is important for the diagnosis but rather the appearance of the precipitate in lower or higher dilutions. Studies on sixty nurslings and twenty-six children revealed that under normal conditions the precipitate begins at a dilution of 1:8. If flocculation appears at higher or lower concentrations, it may be assumed that a disorder exists. The author maintains that in disturbances of nurslings and children the colloid chemical changes can in many cases be determined by means of the Takata reaction.

Klinicheskaya Meditsina, Moscow

13: 763-922 (June) 1935. Partial Index

Mountain and Desert Climate Factor in Diseases Prevalent in Central Asia. I. A. Kassirskiy.—p. 772.
Rare Forms of Hemorrhagic Diathesis. I. I. Mnatsalampv.—p. 791.
Phagocytic Properties of Toxic Leukocytes. R. I. Feldman.—p. 815.
*Morphologic and Biologic Characteristics of Heinz Bodies. S. P. Vinogradskaya and A. M. Kirichenko.—p. 820.
Tonus of Cardiac Muscle. A. M. Sigal.—p. 825.
Effect of High Atmospheric Pressure on Cardiovascular System. A. M. Dikovskiy.—p. 831.

Characteristics of Heinz Bodies.—In order to determine whether the inclusion of Heinz bodies within the erythrocytes is a degenerative or a regenerative process, as well as to determine the physical and chemical characteristics of these bodies, Vinogradskaya and Kirichenko studied the blood of a rabbit in which they produced aniline poisoning by subcutaneous injection of a solution of aniline in oil. They found that the number of Heinz bodies increased in the course of the acute experiment and reached its maximum within from twenty-four to forty-eight hours. The diminution in the number of Heinz bodies was accompanied by a rise in the number of the reticulocytes. The Heinz bodies are not soluble in substances that dissolve lipoids and probably do not represent a purely lipoid structure. The resistance of an erythrocyte containing Heinz bodies is lowered, but that of the bodies themselves is increased. Oxygen absorption capacity by erythrocytes containing Heinz bodies is considerably less than that of reticulocytes, which fact may serve as an index to the age of the erythrocytes. The presence of Heinz bodies within mature erythrocytes speaks for their degenerative character.

Nederlandsch Tijdschrift voor Geneeskunde, Haarlem

79: 5111-5214 (Nov. 2) 1935

Subphrenic Abscess. J. G. Remijnse.—p. 5114.
*Hydroxyestrin Benzoate in Large Doses for Treatment of Primary Chronic Rheumatoid Arthritis. F. C. Kuipers.—p. 5122.
Observations on Physiologic and Anatomic Basis of Hysteria. H. C. Rümke.—p. 5136.
Treatment of Favus in Dermatologic Clinic at Leyden. H. W. Siemens.—p. 5140.

Hydroxyestrin Benzoate in Treatment of Rheumatoid Arthritis.—Kuipers treated three women suffering from chronic rheumatoid arthritis with intramuscular injections of hydroxyestrin benzoate (Progynon B). The weekly dosage for one patient, aged 53, was from 25,000 to 50,000 mouse units for a period of twelve months. Two patients, aged 54 and 23, received 50,000 mouse units weekly for a period of six months. These two patients, who had suffered from the disease for twenty and for sixteen years, responded well to treatment. The patients showed better posture, diminution of the periarticular swelling and return of normal skin temperature. The younger patient, in addition, showed a decrease in the osteoporosis. In all patients the pain increased occasionally during treatment and was accompanied by more articular crepitation. The women suffered from irregular bloody discharges and other minor menstrual disturbances. The third patient, presenting clinical symptoms of secondary chronic rheumatoid arthritis of the feet, gave a roentgenogram of osteo-arthritis. During treatment she showed functional improvement, but no changes occurred in the roentgenogram.

Ugeskrift for Læger, Copenhagen

97: 1003-1032 (Oct. 3) 1935

*Some Comparisons Between Epidemic and Endemic Poliomyelitis: Endemic in Copenhagen in 1934. N. I. Nissen.—p. 1003.
*Blood Picture in Poliomyelitis. P. Plum.—p. 1012.
Treatment of Tuberculosis of Larynx in State Sanatorium. S. F. Nielsen and J. N. Lorenzen.—p. 1018.
Treatment of Opium Eaters with Strychnine and Sodium Thiosulfate. P. Wedel.—p. 1022.

Epidemic and Endemic Poliomyelitis.—Nissen states that 192 patients were treated in the Copenhagen poliomyelitis endemic. Morbidity was relatively high among older school children and adults, and was higher among men than among women. Dementia paralytica occurred most frequently in girls. A study of ninety-seven preparalytic cases showed that the symptoms of drowsiness, unrest, fibrillation, tremor, perspiration, muscular tenderness and a dysphasic picture appeared oftener in the patients in whom dementia paralytica set in after one or more days. In contrast to epidemic poliomyelitis, the absolute cell count is apparently not of especial prognostic value in endemic poliomyelitis. The dementia paralytica generally occurred on the second or third day; the frequency was highest in infants and children at home, decreasing toward school age and increasing again later. The mortality was lowest in infants, rising with the age. The degree of dementia paralytica and the prognosis were considerably more favorable in children at home and school children than in the older age group. As in epidemic poliomyelitis, the degree of the endemic disease depended on the season of the year.

Blood Picture in Poliomyelitis.—Plum says that in poliomyelitis the white blood picture usually shows a slight neutrophil leukocytosis, more marked in grave than in mild cases, with slight shifting to the left. The leukocytosis subsides slowly. In respiratory paralysis a relatively great increase in the number of granulated cells appears immediately before the paralysis, with slight shifting to the left and moderate increase in the absolute number of leukocytes. Similar changes were noted in three cases of poliomyelitis with bulbar paralysis. The blood picture in nonparalytic poliomyelitis does not differ from that in cases with slight paralysis. The author considers the white blood picture a valuable aid in doubtful cases of poliomyelitis, especially in the differential diagnosis between pneumonia complicated with serous meningitis (meningism) and nonparalytic poliomyelitis.

97: 1033-1062 (Oct. 10) 1935

*Weil's Disease in Denmark. B. Kristensen.—p. 1033.
Immunization Against Measles by Aid of Total Blood from Adults. H. Harpøth.—p. 1036.

Weil's Disease.—Kristensen says that, although Weil's disease has been regarded as rare in Denmark, rats from the various parts of the country are found to eliminate virulent Weil spirochetes. In the course of a year nineteen grave cases of the disease have been diagnosed, and probably a larger number of unrecognized milder cases have occurred during that time. Infection during bathing is believed to play a minor part in Denmark in comparison to direct pollution of articles of food and drinking water by rats.